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Safety Services

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Process safety 2021

Siemens Engineering & Consulting

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The combination matters

The sensitive subject of process safety can only be controlled by comprehensive consideration and cooperation between the necessary disciplines. The right combination of consulting, dimensioning and lab investigations ensures a safe and economical plant operation with a high level of process control.

Originating from the center of competence for process safety of former Hoechst AG our team of experts are your dialogue partner since more than 50 years for all aspects of process, plant and product safety. Our particular strength results from the close connection with our process development, process design and engineering team. Our team of experts for all process safety aspects consists of scientists and engineers, as well as certified technical employees.

We are an independent service provider and our test facility is located in modern laboratories of about 1000 m². We apply multiple standardized methods and special equipment. We are GLP certified since more than 30 years.

Through our cooperation in national and international working groups and expert committees we have access to the latest developments and help to shape them.

For the verification of your process safety concept you can rely on our experts accredited to § 29b (1) BImSchG (Federal Immissions Control Act).

Safety related chemical and physical properties

Combustion and explosion behavior of gases, liquids, vapors and dusts, as well as self-ignition behavior of solids

The safe handling of chemical products in the laboratory, pilot plant and production facility requires knowledge of the hazardous properties of substances and reaction mixtures. The intended operations as well as deviations

from the intended process and system parameters have to be taken into account.

We determine the safety parameters necessary for an assessment (e.g., minimum ignition energy, electrical conductivity). The determination of

experimental data takes place in the standardized area in accordance with national and international regulations and in the non-standardized area using current state of the art test methods.

Material-number	Description of service	Necessary test material	
	Basic tests on process safety of liquids (vapors) and gases		
S0401DG001K	Flash point: Single measurement for homogeneous liquids from ambient temperature to 150 °C	50 - 150 ml	
S0401DG002K	Flash point: Triple measurement for complex liquids and mixtures (DIN EN ISO 13736 or DIN EN ISO 2719 or ISO 3679)	50 - 400 ml	
S0401DG003K	Auto ignition temperature of gases and vapors, Triple measurement (DIN 51794 or DIN EN 14522)	50 ml	
S0301EF002K	Sustained combustibility test (UN-Test L.2)	50 ml	
	Additional tests on process safety of liquids (vapors) and gases		
S0401DW001K	Lower or upper explosion limit for vapors under atmospheric conditions (DIN EN 1839)	After consultation	
S0401DW002K	Lower and upper explosion limit for vapors under atmospheric conditions (DIN EN 1839)	After consultation	
S0401DW003K	Determination of the explosion range of gases and vapors also at elevated pressure up to 300 bar and elevated temperature up to 300 °C	After consultation	
S0401DW004K	Limiting oxygen concentration of gases and vapors (DIN EN 14756) also at elevated pressure up to 300 bar and elevated temperature up to 300 °C	After consultation	
S0401DW005K	Explosion characteristics of gases and vapors: p_{max} and K_G -value (DIN EN 13673-1)	After consultation	
S0401DW006K	Lower explosion point of flammable liquids (DIN EN 15794)	2000 - 5000 ml	
	Basic tests on process safety of dusts		
S0401GS004K	General basic test for hazard evaluation of dusts (VDI 2263-1, ISO/IEC 80079-20-2) Flammability ('Brennzahl'), self-heating in contact with air (Grewer screening test), thermal stability (DSC) closed crucible, ignition point, dust explosibility in the Hartmann-Apparatus, minimum ignition energy (single measurement with inductivity) or dust explosibility in the 20 l sphere, particle size distribution	500 g	
S0401GS002K	Dust explosion characteristics: p_{max} and K_{St} -value (VDI 2263-1, EN 14034-1 and -2)	1000 g	
	Additional tests on process safety of dusts		
S0401WS002K	Flammability ('Brennzahl') of dusts (VDI 2263-1)	50 g	
S0401WS003K	Dust explosibility in the Hartmann apparatus with induction spark and/or glowing coil (VDI 2263-1, ISO/IEC 80079-20-2)	100 g	
S0401WS005K	Minimum ignition energy of dusts: Single measurement with inductivity (VDI 2263-1, DIN EN 13821, ISO/IEC 80079-20-2)	200 g	
S0401WS006K	Minimum ignition energy of dusts: Measurement with and without inductivity (VDI 2263-1, DIN EN 13821, ISO/IEC 80079-20-2)	300 g	
S0401WS023K	Minimum ignition energy of dusts at an elevated temperature (above room temperature, up to 140°C, measurement with inductivity)	200 g	
S0401WS024K	Minimum ignition energy of dusts at an elevated temperature (above room temperature, up to 140°C, measurement with and without inductivity)	300 g	
S0401WS026K	Thermal diffusivity (each temperature)	100 ml	

Material-number	Description of service	Necessary test material	
S0401WS010K	Ignition temperature of dispersed dust, Godbert-Greenwald-oven (VDI 2263-1, DIN EN 50281-2-1, ISO/IEC 80079-20-2)	50 g	
S0401WS011K	Lower explosion limit for dusts in the 20 l sphere (closed apparatus) (VDI 2263-1, EN 14034-3)	200 g	
S0401WS012K	Determination of the lower explosion point of a dust bulk containing residues of solvents	After consultation	
S0401WS013K	Limiting oxygen concentration of dusts in the Hartmann apparatus (VDI 2263-1)	200 g	
S0401WS014K	Limiting oxygen concentration of dusts in the 20 l sphere (closed apparatus) (VDI 2263-1, EN 14034-4)	300 g	
S0401WS015K	Self-heating of dusts in contact with air (Greuer screening test) (VDI 2263-1)	20 ml	
S0401WS016K	Self-heating of dusts in contact with air (isoperibolic or adiabatic) for the determination of self-ignition-temperature, in a cylindrical or cubical wire mesh basket (DIN EN 15188, VDI 2263-1), each test	0,1 - 1,1 l	
S0401WS018K	Smolder temperature of dusts (VDI 2263-1, DIN EN 50281-2-1, ISO/IEC 80079-20-2)	200 g	
S0401WS019K	Test for readily combustible solids (UN-test N.1): Screening test for exclusion (Single test)	50 ml	
S0301LE001K	Test for readily combustible solids (UN-Test N.1): Complete Test (up to 6 determinations)	200 ml	
S0401WS020K	Determination of the electrical conductivity / electrical resistance (DIN IEC 60093 / VDE 0303-30, ISO/IEC 80079-20-2, TRGS 727)	50 g	
S0401WS022K	Determination of the particle size distribution (Laser diffraction spectrometer or dry sieving)	250 ml	
S0401WS027K	Ignition point max. 350°C	100 g	

The report for the documentation and evaluation of the data of combustion and explosion behavior of gases, liquids, vapors and dusts, as well as self-ignition behavior of solids will be charged additionally.

Example: Screening in the modified Hartmann tube

Due to their extreme large surface dust clouds might react explosively when they are mixed with air and an ignition source is present.

Dust clouds might occur at many steps in processes and during manufacturing, e.g. during charging, transferring or during micronation. Whether your product has such a hazard potential for dust explosivity can be examined in our test laboratory. Additionally, we are able to experimentally determine the relevant dust explosion characteristics to develop the necessary protection measures. A first screening in regard to dust explosivity can be carried out on a relatively low-cost basis in a modified Hartmann tube.



Thermal Stability of Substances and Reaction Mixtures

The safe handling of chemical products in the laboratory, pilot plant and production facility requires knowledge of the hazardous properties of substances and reaction mixtures. The intended operations as well as deviations from the intended

process and system parameters have to be taken into account.

We determine the safety parameters necessary for an assessment (e.g., T_{MR24} , gas production rate of decomposition). The determination of

experimental data takes place in the standardized area in accordance with national and international regulations and in the non-standardized area using current state of the art test methods.

Material-number	Description of service	Necessary test material	
	Screening tests for the evaluation of the thermal stability of substances and reaction mixtures		
S0402ST002K	Differential Scanning Calorimetry (DSC) up to 400°C. Double measurement for the determination of limiting temperature T_{exo} (multiple measurement) (OECD 113)	1 g	
S0402ST005K	Differential Scanning Calorimetry (DSC) under 20 bar air (single measurement)	1 g	
S0402ST006K	Differential Scanning Calorimetry (DSC) up to 500 °C as screening for classification	1 g	
	Additional tests for the evaluation of the thermal stability of substances and reaction mixtures		
S0402TT001K	Specific heat capacity of solids and liquids as a function of temperature up to max. 300 °C in the DSC.	1 g	
S0402TT005K	Adiabatic heat storage test (closed system) without stirring for the determination of e.g. induction times (for example AZT ₂₄), the limit temperature T_{exo} and gas production rate	300 ml	
S0402TT006K	Test on deflagration in a closed system	100 g	
S0402TT007K	Stirred adiabatic heat storage test (closed system) for the determination of e.g. induction times (for example AZT ₂₄), the limit temperature T_{exo} for safe processing and the gas production rate	300 ml	
S0402TT008K	Deflagration open system (UN C.2)	600 ml	
S0301SB007K	Time/pressure test UN 1(C), 2(C), C.1 (propagation of a deflagration)	20 g	

The report for the documentation and evaluation of the data for thermal behavior of substances and reaction mixtures will be charged additionally.

Example: DSC-Measurements

The knowledge about the thermal stability of a substance is indispensable. An untested substance might lose quality or even provoke severe dangers at too high temperatures during manufacturing, storage or during transport.

For every phase in the use of new substances we provide the adapted testing and evaluation of the thermal stability.

In a first step for the determination of the thermal stability of unknown substances we can clarify the risks of thermal stability by DSC measurement of just 10-20 mg sample. In many cases this measurement already enables us to define the limiting temperature T_{exo} for safe handling during a process or we can provide exclusion from certain classifications as dangerous substance/good.



Characterization of Chemical Reactions

The safe handling of chemical reactions in the laboratory, pilot plants and production facilities requires knowledge of the hazardous properties of substances and reaction mixtures. The intended operations as well as deviations from the intended

process and system parameters have to be taken into account.

We determine the safety parameters necessary for an assessment (e.g., reaction enthalpy, heat / gas production rate, adiabatic

temperature increase). The determination of experimental data takes place in the standardized area in accordance with national and international regulations and in the non-standardized area using current state of the art test methods

Material-number	Description of service	Necessary test material	
	Tests for the characterization of a chemical reaction for the determination of e.g. reaction enthalpy and heat production rate		
S0403SR001K	RC1 calorimeter (heat flow calorimeter from 0 up to 60 bar, between -50° up to +230°C): Standard test	50 - 2000 ml	
S0403SR006K	RC1 Calorimeter (additional test day)	50 - 2000 ml	
	Investigations for characterizing deviations from normal operation under adiabatic conditions		
S0403UR002K	Determination of the characteristics of a runaway reaction in a Vent Sizing Package (VSP) reaction calorimeter (recommendation: combination with a validation method (RC1, VSP or heat storage test)) Characteristics of runaway reactions in the VSP calorimeter	100 ml	

The report for the documentation and evaluation of the data for chemical reactions will be charged additionally.

Design of safety equipment and retention systems

The design of pressure relief devices for pressure vessels requires a careful analysis of the possible fault scenarios that could lead to an unacceptable increase in pressure. We develop concepts for safe plant operation with different methods – from simple flow calculations up to dynamic simulation of multi-phase flows – e.g. the DIERS methodology.

If a container is to be secured with a safety valve or rupture disk, the pressure losses in the connected piping as well as a safe relieve have to

be considered. If necessary, appropriate retention systems for minimized environmental impacts have to be provided. You receive a data documentation sheet for each pressure relief device on which the design principles and results are summarized.

Concepts and systems for the retention of the released substances are developed. To ensure the risk-free relieve, we conduct the necessary dispersion calculations and assess the

possible consequences of incidents as part of safety reports.

Pressure surges in pipelines can occur by any sudden change in flow velocity. For instance, fast-closing valves cause cavitation bubbles. Their collapse leads to violent pressure surges which can exceed the load limits of the pipeline. Our scope of services includes the flow calculations of these dynamic processes to identify measures to avoid such pressure shock

Material-number	Description of service	
	Design of pressure relief systems	
S0404AD003K	Safety valve design: Standard I (simple) Design of a safety valve or rupture disc for a simple design case on basis of a simple fluid dynamic calculation, e.g. pressure rise caused by failure of a pressure reducer	
S0404AD004K	Safety valve design: Standard II (normal) Design of a safety valve or rupture disc for a standard design case incl. a simple process technological calculation, e.g. pressure rise due to evaporation	
S0404AD007K	Safety valve design: Additional standard design case	
S0404AD008K	Safety valve design: Documentation Documentation of the design calculation of a pressure relief device in a data sheet	
	Fluid dynamics in pipe networks	
S0404SR001K	Stationary fluid dynamic calculation: e.g. fluid dynamic optimization of pipe networks, pressure loss calculations	
S0404SR002K	Transient fluid dynamic calculations: e.g. recommendation of measures to avoid extraordinary loads based on prediction of dynamic reaction forces caused e.g. by turn off of pumps, rapid closing of valves, cavitation etc. for the optimization of pipe networks	
	Dispersion Calculations	
S0404SS001K	Dispersion calculations: Standard - VDI guideline 3783 for neutral gas and heavy gas - Given release mass flow rate - Documentation in a report	
S0404SS002K	Dispersion calculations: Complex systems (additional) - Calculation of the release mass flow rate - Jet dispersion - Calculation of hazardous areas around release sources	
	Special services calculations	
S0404ZZ001K	Surcharge for complex calculations	

Plant and Process Safety Consulting

Together with you we develop the concept for the safe operation of your process. We assess the safety characteristics of the chemical substances and reaction mixtures with regard to a safe process control for your individual process steps.

Our experts are experienced leaders of HAZOPs and safety talks. In systematic risk analyses we assess and document the safe operation of your plant and your process. We will assist you with permits and contacts with authorities, for example with development of explosion protection concepts, implementation of the European employment protection legislation or health and safety regulations and preparation of the safety report according to the Seveso directive in the EU.

Some of our experts are accredited to § 29b (1) BImSchG (Federal Immission Control Act) in Germany.

With targeted audits we review your plants and procedures regarding the compliance with the state-of-the-art safety technology, the conformity with laws and regulations, and the conformity with the valid permits.

In addition to these classical topics of process and plant safety we offer all necessary services for the implementation of safety instrumented systems. According to the IEC 61511 – and all other depending norms – we offer you guidance and consulting in all phases of your safety life cycle up to verification and validation (e.g. SIL verification, hard and software audits).

If despite all precautions a (near) incident occurred, we offer our assistance as experts in the field of process safety for the analysis of the accident. To investigate complex incidents, we make use of dedicated

measurement methods that go far beyond routine testing. The experience of numerous accident analyses in the past contributes to our work.

A brief overview of our services:

- **Design of safe chemical reactions and physical processes**
- **Safety assessment for your process or plant**
- **Development of explosion protection concepts**
- **Safety and risk analyses (e.g. HAZOP)**
- **SIL classification**
- **Management of functional safety**
- **Safety requirement specification (SRS)**
- **Preparation of the safety plan**
- **Verification and validation**
- **Auditing**
- **Incident analysis**
- **Training and workshops for process safety**

Material-number	Description of service	
	Consulting on process safety	
S0405BS001K	Assessment of safety data and process safety (Price on expense per unit)	
S0405BS011K	Senior Consultant on process safety (per hour)	
S0405BS012K	Lead Consultant on process safety (per hour)	
S0405BS013K	Consultant on process safety (per hour)	
S0405BS014K	Project Consultant on process safety (per hour)	
	Custom Workshops on functional safety for the process industry	
S0405BS008K	IEC 61511 Functional Safety for the process industry (WSFSP)	
S0405BS009K	IEC 61511 TÜV-certificate functional safety (WSFSP)	
S0405BS010K	IEC 61511 Practical applications (WSPUP)	
	Special studies	
S0405ZZ001K	Special experimental investigations on process safety	
S0405ZZ002K	Surcharge for additional expenses in the case of (per unit): <ul style="list-style-type: none"> - Studies with very toxic substances - Studies with very aggressive substances (e.g. corrosive) - Studies on difficult to handle substances (e.g. highly electrostatic chargeable) - Special experimental set-ups - Additional preparation of test substances (e.g. milling, sieving, drying) 	
S0405ZZ003K	Surcharge for accelerated processing (per unit)	

Insight into our practice

Physical-chemical data for registration – using synergies

In order to create meaningful substance registration dossiers (e.g. for REACH), it is essential to have reliable data on the properties of each substance. The physico-chemical tests that are carried out in our laboratories for registration purposes are almost always standardized tests, but for their successful implementation, extensive chemical expertise is irreplaceable. This applies to all phases of the test procedure: the selection of the appropriate tests and test methods (e.g. for the determination of the vapor pressure), the performance of the tests (e.g. development of the correct analysis for the determination of water solubility) and above all for the interpretation of the results (e.g. self-heating characteristics). The last example also shows the chances of linking REACH with the CLP regulation for classification. According to the ECHA, it is recommended that physico-chemical data, which is also used for classification, be carried out according to the corresponding UN tests. This has significant added value as it allows the data from a single test to be used for REACH registration, classification for CLP and transport classification of a substance. The above aspects show that a high level of expertise is required to select and evaluate the studies.

By combining physical-chemical and safety-related know-how in our laboratory, we can not only help you with standard examinations, but also with complex questions for the registration or difficult-to-handle substances (e.g. due to high toxicity, with tough samples, which are difficult to dose or even samples with a low boiling point).

In recent years, we have been able to help a large number of customers (from various industries and countries) with our expertise and our equipment options. We look forward to supporting you in the future with your registrations as well as with classification and safety-related questions.



Product Safety

The classification of your substances in relevant international technical inquiries and tests not listed here please according to GHS / CLP and the committees. contact us

The classification according to transport regulations (GGVS / ADR) is one of our specializations due to our participation in our physical-chemical laboratory. For The required test methods are available

Material-number	Description of service	Necessary test material	
S0301TE004K	Screening package for transport regulation (solids) (DSC, DSC 20 bar air, Grewer-oven, flammability (screening), incl. assessment)	100 ml	
S0301TE005K	Screening package for transport regulation (liquids) (DSC, flashpoint, incl. assessment)	50-250 ml	
	Class 1 "Explosive properties"		
S0402ST006K	Differential Scanning Calorimetry (DSC) up to 500 °C as screening for classification	1 g	
S0301EE001K	Basic test on explosion properties: Mechanical sensitivity (friction test and impact test / BAM) and thermal sensitivity (Koenen test) UN-Test 3 (b) (i), UN-Test 3 (a) (ii) und UN-Test 1 (b), 2 (b), E.1	350 ml	
S0301EE002K	Basic test on explosion properties: Mechanical sensitivity (friction test) (6 – 12 tests) (UN-Test 3 (b) (i))	5 ml	
S0301EE003K	Basic test on explosion properties: Mechanical sensitivity (impact test / BAM) (6 – 12 tests) (UN-Test: 3 (a) (ii))	5 ml	
S0301EE004K	Basic test on explosion properties: Thermal sensitivity (Koenen test) (10 tests) (UN-Test: 1 (b); 2 (b)), E.1	350 ml	
S0301SB007K	Time-Pressure-Test, UN-Test 1 (c), 2(c) und C.1	20 g	
	Class 2 "Inflammable aerosols"		
S0301EG001K	UN Ignition distance test for spray aerosols	after consultation	
S0301EG002K	UN Enclosed space ignition test (aerosols)	after consultation	
	Class 3 "Flammable liquid substances"		
S0401DG002K	Flash point: Triple measurement for complex liquids and mixtures (DIN EN ISO 13736 or DIN EN ISO 2719 or ISO 3679)	50 - 400 ml	
S0301EF002K	Sustained combustibility test (UN-Test L.2)	50 ml	
	Class 4.1 " Readily combustible solids"		
S0401WS019K	Test for readily combustible solids (UN-Test N.1) Screening test for exclusion (Single test)	50 ml	
S0301LE001K	Test for readily combustible solids (UN-Test N.1), (6 determinations)	200 ml	
	Class 4.1 "Self-reactive substances"		
S0402ST002K	Differential scanning calorimetry (DSC) up to 400°C (max.). Double measurement for the determination of limiting temperature T _{exo} ()	1 g	
S0402TT005K	Heat accumulation test in a closed system (without stirring) to determine the SADT / SAPT (UN test H.2)	300 ml	
S0301SB007K	Time-Pressure-Test, UN-Test 1(c), 2(c) und C.1	20 g	
S0301EE004K	Basic test for explosive properties: Thermal sensitivity (Koenen test), UN test 1 (b), 2 (b), E.1	350 ml	
	Class 4.2 "Self-heating substances"		
S0401WS015K	Self-heating of dusts in contact with air (Grewer screening test) (VDI 2263-1)	20 ml	
S0301SE001K	Self-heating in a 1 l wire mesh basket (UN-Test N.4) (per temperature)	1100 ml	
S0301SE002K	Self-heating in a 15,6 cm ³ wire mesh basket (UN-Test N.4)	25 ml	
S0301SE003K	Pyrophoric properties (UN-Test N.2, N3)	50 g	
	Class 4.3 "Substances which in contact with water emit flammable gases"		
S0301SW002K	UN-Test N.5: Complete test which in contact with water emit flammable gases (UN-Test N.5)	100 g	

*On Request

Material-number	Description of service	Necessary test material	
	Class 5.1 "Oxidizing substances"		
S0301TE002K	Test for oxidizing properties of solids (UN test O.1)	250 mg	
S0301TE003K	Test for oxidizing properties of liquids (UN-Test O.2)	50 mg	
S0301TE006K	UN test O.3, test for oxidizing properties of solids	300 mg	

The report for the documentation and evaluation of the data for classification according to GHS / CLP and transport regulations will be charged additionally.

Example: UN-Test O.3

A number of properties have to be tested and evaluated for the classification of hazardous substances (GHS/CLP) and dangerous goods (transport).

The oxidizing properties are one of these classifications. The necessary tests for liquids and solids can be performed by us. Prior to practical testing we can evaluate based on the chemical structure and the purity of the sample whether such a test is mandatory or whether an economically expert statement can be written by us.

The UN Test O.3 is one of two possible test methods to determine the oxidizing properties of a solid for classification according the CLP and UN Manual of Tests and Criteria for transport purposes.



Studies in accordance with GLP “Good Laboratory Praxis”

Physico-chemical tests necessary for the registration of new substances according to the European Commission Regulation (EC) No 440/2008 and the OECD guidelines can be performed under the conditions of good laboratory practice (GLP). In addition, supplementary tests are also conducted under GLP, for example tests according to CIPAC guidelines.

We also provide coordination and project management for all tests required for the registration

Material-number	Description of service	Necessary test material	
	GLP A.1. (EG440/2008) Melting point (OECD 102)		
S0302AA001K	GLP A.1. (EG440/2008) Melting - / freezing point (DSC or capillary method) (OECD 102)	1 g	
	GLP A.2. (EG440/2008) Boiling point (OECD 103)		
S0302AB001K	GLP A.2. (EG440/2008) Boiling point (DSC or capillary method) (OECD 103)	1 g	
	GLP A.3. (EG440/2008) Relative density (OECD 109)		
S0302AC001K	GLP A.3. (EG440/2008) Relative density of liquids (OECD 109)	120 ml	
S0302AC002K	GLP A.3. (EG440/2008) Relative density of solids and powders (OECD 109)	20 g	
	GLP A.4. (EG440/2008) Vapor pressure (OECD 104)		
S0302AD001K	GLP A.4. (EG440/2008) Vapor pressure (OECD 104): effusion method, pressure range 0,001 Pa < p < 10 Pa	10 g	
S0302AD002K	GLP A.4. (EG440/2008) Vapor pressure (OECD 104): dynamic method, pressure range 1 kPa < p < 100 kPa	100 ml	
S0302AD003K	GLP A.4. (EG440/2008) Vapor pressure (OECD 104): static method, pressure range 1 kPa < p < 2000 kPa	100 ml	
	GLP A.5 (EG440/2008) Surface tension (OECD 115)		
S0302AE001K	GLP A.5 (EG440/2008) Surface tension (OECD 115)	10 ml	
	GLP A.6. (EG440/2008) Water solubility (OECD 105)		
S0302AF001K	GLP A.6. (EG440/2008) Water solubility (OECD 105): Flask method	100-200g	
S0302AF002K	GLP A.6. (EG440/2008) Water solubility (OECD 105): Column elution method	10 g	
S0302AG004K	GLP A.6. Solubility of Gases in Solvents or Water	150 g	
	GLP Partition coefficient		
S0302AG001K	GLP A.24. (EG440/2008) Partition coefficient: HPLC-Method (OECD 117)	1 g	
S0302AG002K	GLP A.8. (EG440/2008) Partition coefficient: Shake-Flask-Method (OECD 107)	50 - 100 g	
S0302AG003K	GLP A.8. (EG440/2008) Partition coefficient: Flask method (OECD 105) (additionally to S0302AF001K or S0302AF002K , alternatively the necessary information has to be provided)	200g	
	GLP Flash point		
S0302AH001K	GLP A.9. (EG440/2008) Flash point (Pensky-Martens, Abel-Pensky or rapid equilibrium method)	50 - 250 ml	
S0302AH002K	GLP UN L.2 Sustained combustibility	60 ml	
	GLP Flammability solid		
S0302AI001K	GLP A.10. (EG440/2008) (UN N.1) Flammability solids: Screening Test	50 ml	
S0302AI002K	GLP A.10. (EG440/2008) or (UN N.1) Flammability solids: Complete test	200 ml	

	GLP A.11. (EG440/2008) Flammability gases		
S0302AJ001K	GLP A.11. (EG440/2008) Flammability gases	100 g	
S0302AJ002K	GLP UN Ignition distance test for spray aerosols	after consultation	
S0302AJ003K	GLP UN Enclosed space ignition test (aerosol)	after consultation	
	GLP Flammability water: Screening		
S0302AK002K	GLP A.12. (EG440/2008) or (UN N.5) Flammability: Substances which in contact with water evolve flammable gases: Complete test	100 g	
	GLP Pyrophoric properties		
S0302AL001K	GLP A.13. (EG440/2008) (UN N.2/N.3) Pyrophoric properties of solids and liquids	50 g / 50 ml	
	GLP Explosive properties		
S0302AM001K	GLP screening explosive properties: (DSC up to 500 °C)	5 g	
S0302AM002K	GLP A.14. (EG440/2008) Explosive properties: Complete test	350 g	
S0302AY003K	GLP UN 1(c), 2(c), C.1 Time-Pressure-Test	30 g	
S0302AY004K	GLP Koenen-Test (UN 1 (b), 2 (b)) + Time-Pressure-Test ((UN 1 (c), 2 (c))	400 ml	
S0302AY005K	GLP Friction sensitivity (UN 3 (b)), Impact sensitivity (UN 3 (a)), Koenen-Test (UN 1 (b), 2 (b)) + Time-Pressure-Test ((UN 1 (c), 2 (c))	450 ml	
	GLP A.15. (EG440/2008) Auto ignition temperature		
S0302AN001K	GLP A.15. (EG440/2008) Auto ignition temperature (for liquids and gases)	50 ml	
	GLP Auto ignition (solids)		
S0302AO001K	GLP A.16. (EG440/2008) Auto-flammability (solids-determination of relative self-ignition temperature)	25 ml	
S0302AO004K	GLP Grewer-Oven (VDI2263): Screening for the self-ignition behavior of solids	25 ml	
S0302AO002K	GLP Bowes-Cameron-Cage Test 1(1-l wire basket at 140 °C) (UN-Test N.4)	1100 ml	
S0302AO003K	GLP Bowes-Cameron-Cage Test 2 / 3 / 4 (UN-Test N.4 (in addition to S0302AO002K each test))	20 ml bzw. 1100 ml je Test	
	GLP Oxidizing properties solids		
S0302AP002K	GLP A.17. (EG440/2008) Oxidizing properties solids: Complete test	500 g	
S0302AP005K	GLP UN O.1(UN Manual of Test and Criteria): Oxidizing properties solids	250 g	
S0302AP006K	GLP UN O.3 (UN Manual of Test and Criteria): Oxidizing properties solids	300 g	
	GLP A.20. (EG440/2008) Extraction behavior (OECD 120)		
S0302AQ001K	GLP A.20. (EG440/2008) Extraction behavior of polymers (OECD 120)	100 g	
	GLP Oxidizing properties of liquids		
S0302AP003K	GLP A.21. (EG440/2008) (UN O.2, reference: nitric acid) Oxidizing properties of liquids	50 g	
S0302AP004K	GLP UN O.2: (2 or 3 references) (UN Manual of Test and Criteria): Oxidizing properties of liquids	50 g	
	GLP C.7. (EG440/2008) Degradation - abiotic degradation - hydrolysis (OECD 111)		
S0302AR001K	GLP C.7. (EG440/2008) Degradation - abiotic degradation - hydrolysis (OECD 111), tier 1	10 g	
S0302AR002K	GLP C.7. (EG440/2008) Degradation - abiotic degradation - hydrolysis (OECD111), Degradation rate and identification of the hydrolysis products (in addition to S0302AR001K per delivery unit) main test (level 2 and 3) at cost	50-100 g	
	GLP C.19. (EG440/2008) Adsorption coefficient (OECD 121)		

S0302AT001K	GLP C.19. (EG440/2008) Adsorption coefficient: HPLC-Screening (OECD 121)	1 g	
	GLP Particle size		
S0302AU004K	GLP Particle size distribution (ISO 13320, CIPAC MT 187, (OECD 110))	250 ml	
	Physico-chemical studies according to OECD-guidelines and CIPAC-methods		
S0302AY006K	GLP Screening dust explosibility Hartmann tube (ISO/IEC 80079-20-2) including particle size distribution (1 measurement) and residual moisture	200 g	
S0302AV001K	GLP A.25. (EU2017/735) Dissociation constant in water (OECD 112), spectrometric method	5-10 g	
S0302AV078K	GLP A.25. (EU2017/735) Dissociation constant in water, titrimetric (OECD 112)	10 g	
S0302AV002K	GLP Thermal stability (OECD 113), DSC up to 400 °C	1 g	
S0302AV004K	GLP UV/VIS Absorption-spectra (OECD 101)	5 g	
S0302AV005K	GLP Viscosity of liquids (OECD 114), capillary viscosimeter	100 ml	
S0302AY002K	GLP Viscosity of non-Newtonian samples (Rheometer), (OECD 114)	20 ml	
S0302AV006K	GLP pH-Value of solutions (OECD 122 or CIPAC MT 75)	3 g	
S0302AV007K	GLP Acidity / Alkalinity of solutions (OECD 122, CIPAC MT 31 or CIPAC MT 191)	after consultation	
S0302AV033K	GLP Solubility in organic solvents (CIPAC MT 181)	After consultation	
S0302AV100K	GLP statement on simple physical-chemical properties		
	Analytical method		
S0302AW001K	Development / adapting of an analytical method		
S0302AW003K	GLP HPLC-Analysis		
S0302AW004K	GLP GC-Analysis		
S0302AW005K	GLP UV/VIS Absorption-spectra (OECD 101)		
	Special services		
S0302AX004K	Preparation of the IUCLID-files (Section 4 „Physical and chemical properties“)		
S0405ZZ004K	GLP-Surcharge each unit: - Multisite-studies - Special requirements within a GLP-study, e.g. experimental set-up or sample preparation		

We gladly offer other methods, e.g. CIPAC, on request.

Example: Water solubility

The water solubility is a very important item for the registration of substances (e.g. for REACH) and is used for the evaluation of toxicological or Eco toxicological properties of substances.

Chemical substances might have very different water solubility. To cover all aspects, we use different methods for the determination of water solubility, such as flask or column elution method. The necessary analytics will be provided by us or by our certified collaboration partner.



Registration of New and Existing Substances according to REACH

For the registration of new and existing substances under REACH many physico-chemical data have to be provided to ECHA. For the classification of substances and mixtures according to the CLP regulation also some physico-chemical data have to be provided. Both regulations are well connected. For the REACH registration the required physico-chemical data have to be determined according to the

European Commission Regulation (EC) No 440/2008. For the CLP classification the data have to be measured according to the UN Manual for Test and Criteria.

To reduce the amount of work and to avoid redundant testing ECHA proposes for several physico-chemical data to use the methods according to the UN Manual of Test and Criteria.

Some other are determined according to the OECD guidelines.

We will be glad to give you guidance which tests should be used.

In addition, we will prepare the required IUCLID files for registration.

Material-number	Description of service	Necessary test material	
S0302AV037K	A.1. (EG440/2008) Melting / Freezing point (OECD 102), report included	1 g	
S0302AV038K	A.2. (EG440/2008) Boiling point (OECD 103), report included	1 g	
S0302AV039K	A.3. (EG440/2008) Relative density (OECD 109), report included	120 ml	
S0302AV040K	A.4. (EG440/2008) Vapor pressure (OECD 104): effusion method, 0.001 Pa < p < 10 Pa, report included	10 g	
S0302AV041K	A.4. (EG440/2008) Vapor pressure (OECD 104): dynamic method, 1 kPa < p < 100 kPa, report included	100 ml	
S0302AV042K	A.4. (EG440/2008) Vapor pressure (OECD 104): static method, 1 kPa < p < 2000 kPa, report included	100 ml	
S0302AV043K	A.5. (EG440/2008) Surface tension (OECD 115), report included	5 ml	
S0302AV044K	A.6. (EG440/2008) Water solubility (OECD 105): Flask method, report included	100-200 g	
S0302AV045K	A.6. (EG440/2008) Water solubility (OECD 105): Column elution method, report included	10 g	
S0302AV081K	A.6. Gas solubility in liquids, report included	150 g	
S0302AV046K	A.24. (EG440/2008) Partition coefficient (OECD 117) HPLC method, report included	1 g	
S0302AV047K	A.8. (EG440/2008) Partition coefficient (OECD 107) Shake flask method, report included	50-100 g	
S0302AV048K	A.8. (EG440/2008) Partition coefficient (OECD 105) Flask method, report included (in addition to S0302AV044K or S0302AV045K, alternatively the corresponding information must be provided)	100-200 g	
S0302AV049K	A.9. (EG440/2008) Flash point, report included	50-250 ml	
S0302AV050K	A.10. (EG440/2008) (UN N.1) Flammability (solids): Screening test, report included	50 ml	
S0302AV051K	A.10. (EG440/2008) or (UN N.1) Flammability (solids): Complete test, report included	200 ml	
S0302AV052K	A.11. (EG440/2008) Flammability (gases), report included	100 g	
S0302AV054K	A.12. (EG440/2008) or (UN N.5) Flammability by contact with water: Complete test, report included	50 g	
S0302AV055K	A.13. (EG440/2008) (UN N.2/ N.3) Pyrophoric properties of solids and liquids, report included	50 g / 50 ml	
S0302AV056K	Danger of explosion: Screening test (DSC up to 500 °C), report included	5 ml	
S0302AV057K	A.14. (EG440/2008) Danger of explosion: Complete test, report included	350 ml	
S0302AV087K	Koenen-Test (UN 1 (b), 2 (b)) + Time-Pressure-Test ((UN 1 (c), 2 (c)) including report	400 ml	
S0302AV088K	Friction sensitivity (UN 3 (b)), Impact sensitivity (UN 3 (a)), Koenen-Test (UN 1 (b), 2 (b)) + Time-Pressure-Test ((UN 1 (c), 2 (c)) including report	450 ml	
S0302AV058K	A.15. (EG440/2008) Auto ignition temperature (liquids and gases), report included	50 ml	
S0302AV059K	A.16. (EG440/2008) Relative Auto ignition temperature for solids, report included	25 ml	750,00

*On Request

Material-number	Description of service	Necessary test material	
S0302AV086K	Grewer-Ofen (VDI2263 Blatt 1) - Screening for the self-heating properties of solids, report included	25 ml	
S0302AV060K	Bowes-Cameron-Cage Test Step 1 (UN-Test N.4), report included	1100 ml	
S0302AV061K	Bowes-Cameron-Cage Test Step 2 / 3 / 4 (UN-Test N.4) (in addition to S0302AV061K each test), report included	20 or 1100 ml each Test	
S0302AV063K	A.17. (EG440/2008) Oxidizing properties solids: Complete test, report included	500 g	
S0302AV084K	UN O.3 Oxidizing properties of solids, report included	250 g	
S0302AV077K	A.20. (EG440/2008) Solution / extraction behavior of polymers in water (OECD 120), report included	100 g	
S0302AV064K	A.21. (EG440/2008) (UN O.2 (reference nitric acid)) Oxidizing properties of liquids, report included	50 g	
S0302AV083K	UN O.2 (2 or 3 references) Oxidizing properties of liquids, report included	50 g	
S0302AV065K	Particle size distribution (ISO 13320, CIPAC M 187, (OECD 110)), report included	250 ml	
S0302AV069K	A.25. (EU2017/735) Dissociation constant in water, spectrometric method (OECD 112), report included	5-10 g	
S0302AV079K	A.25. (EU2017/735) Dissociation constant in water, titrimetric (OECD 112), report included	10 g	
S0302AV070K	Viscosity of liquids, Capillary viscometer (OECD 114), report included	100 g	
S0302AV085K	Viscosity of non-Newtonian samples (Rheometer), (OECD 114), report included	20 ml	
S0302AV071K	UV/Vis Absorption spectra (OECD 101), report included	5 g	
S0302AV072K	Thermal stability (OECD 113) (DSC up to 400 °C), report included	1 g	
S0302AV074K	Solubility in organic solvents (CIPAC MT 181), report included	on inquiry	
S0302AV101K	Statement for physical-chemical properties		
	Analytical method		
S0302AW001K	Development / adapting of an analytical method		
S0302AW003K	HPLC-Analysis for GLP-studies		
S0302AW004K	GC-analysis for GLP-studies		
S0302AW005K	UV/VIS analysis for GLP-studies		
	Notification		
S0302AX003K	Preparation of a certificate of analysis		
S0302AX004K	Preparation of the IUCLID-files (Section 4 "Physical and chemical properties")		

The afore mentioned positions are for registration purposes. With exception of the positions concerning analytical purposes and notification a report is included.

Example: Grewer-Oven

Sedimented dust is not just unaesthetic to look at – it can also be dangerous! The reason is a potential reaction of the solid with oxygen from the surrounding air. At low temperatures the oxidation reaction is still relatively slow. The speed of this reaction might be much higher on hot surfaces or in thick layers where due to the isolation heat accumulation occurs – this can lead to a self-ignition.

First data on self-ignition behavior of solids can be determined by application of the Grewer oven. These data are needed for registration and classification of solids according to REACH, GHS/CLP or UN-Transport classification, and for safety considerations.



Determination of physico-chemical property data for production-related questions

Our physical-chemical test methods are also applied to solve production-related questions, such as measuring vapor pressures for material safety data sheets.

Material-number	Description of service	Necessary test material	
S0503ZZ001K	Melting point (DSC or capillary method)	1 g	
S0503ZZ002K	Boiling point (DSC or capillary method)	1 g	
S0503ZZ004K	Vapor pressure: effusion method, pressure range 0,001 Pa < p < 10 Pa	10 g	
S0503ZZ005K	Vapor pressure: dynamic method, pressure range 1 kPa < p < 100 kPa	100 ml	
S0503ZZ006K	Vapor pressure: static method, pressure range 1 kPa < p < 2000 kPa	100 ml	
S0503ZZ009K	Gas solubility	150 g	
S0503ZZ010K	Viscosity of non-Newtonian samples (Rheometer), (OECD 114), each temperature	20 ml	

Further physicochemical data can be found in the previous chapter.

The report for the documentation and evaluation of physico-chemical property data will be charged additionally.

Process Engineering

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