IDENTIFICATION

Hydrogen peroxide solution
Hydrogen superoxide solution

ZVG number: 2430  
CAS number: 7722-84-1  
INDEX number: 008-003-00-9  
EC number: 231-765-0

CHARACTERISATION

SUBSTANCE GROUP CODE

121210  Peroxides and hyperoides, inorganic

STATE OF AGGREGATION

At 1013 mbar/20 °C: liquid

PROPERTIES

Colour: colourless  
Odour: nearly odourless

CHEMICAL CHARACTERISATION

Highly reactive oxidizing liquid.  
The substance itself does not burn, but reacts so violently with inflammable substances that it can partly ignite them without any other sources of combustion and fuel any existing fire substantially.  
Mixable with water.  
Aqueous solution reacts acidic.  
Slightly volatile.  
With catalysts or at elevated temperatures hydrogen peroxide decomposes to hydrogen and oxygen.  
Acute or chronic health hazards result from the substance.  
(see: CLASSIFICATION/LABELLING).
FORMULA

H₂O₂

H—O—O—H

Molar mass: 34.01 g/mol

Conversion factor: 1 ml/m³ = 1.41 mg/m³ at 1013 mbar/20 degrees C

TOXICOLOGY / ECOTOXICOLOGY

TOXICOLOGICAL DATA

LD₅₀ oral rat: 376 mg/kg

LD₅₀ dermal Rat: 3000 mg/kg

LC₅₀ inhalation rat: 2 mg/l/4 h

Source: 02071

ECOTOXICOLOGICAL DATA

LC₅₀ Fish (96 hours)
Minimum: 22 mg/l
Maximum: 26.7 mg/l
Median: 24.4 mg/l
Study number: 2

EC₅₀ Crustaceans (48 hours)
Minimum: 2.32 mg/l
Maximum: 24 mg/l
Median: 13.2 mg/l
Study number: 2
EC50 Algae (72 or 96 hours)
Test duration: 72 Stunden
Minimum: 0,71 mg/l
Maximum: 5,81 mg/l
Median: 3,36 mg/l
Study number: 6
Source: 02072

EC50 Algae (72 or 96 hours)
Test duration: 96 Stunden
Minimum: 5,38 mg/l
Maximum: 6,49 mg/l
Median: 5,74 mg/l
Study number: 3
Source: 02072

PHYSICAL AND CHEMICAL PROPERTIES

MELTING POINT
Melting point: -33 °C
hydrogen peroxide 35 %

Melting point: -0,41 °C
pure substance

BOILING POINT
Boiling Point: 108 °C
hydrogen peroxide 35 %
continuous lowering of the boiling point due to decomposition

Boiling Point: 150,2 °C
pure substance

**DENSITY**

**RELATIVE VAPOUR DENSITY**
Ratio of the density to dry air at the same temperature and pressure  
Value: 1,17

**DENSITY**  
Value: 1,45 g/cm³  
pure substance  
Temperature: 20 °C

**DENSITY**  
Value: 1,71 g/cm³  
pure substance  
Temperature: -20 °C

**RELATIVE DENSITY OF THE VAPOUR-AIR-MIXTURE**
Ratio of the density to dry air at 20 °C and standard pressure  
Value: 1,00

**VAPOUR PRESSURE**

Vapour pressure: 1,9 mbar  
Temperature: 20 °C

Vapour pressure: 3,9 mbar  
Temperature: 30 °C

Vapour pressure: 13,2 mbar  
Temperature: 50 °C

**SOLUBILITY IN WATER**

entirely mixable

**pH-VALUE**

pH-value: 3,3  
Concentration: 30 %

**HAZARDOUS REACTIONS**

**Thermal decomposition:**  
The decomposition rate, which is low at room temperature,
is accelerated by heat, light and alkalis. It can increase to an explosion.

**Decomposition products:**
water; oxygen;

**Hazardous chemical reactions:**
Hydrogen peroxide > 60% reacts in the following way:

Risk of explosion in contact with:
- acetaldehyde; acetone; alcohols (rare); ammonia; acetic anhydride; formaldehyde; hydrazine; hydrazine hydrate; oil -> decomposition; iridium; ketenes; nitromethane;
- phosphorus pentoxide; thiourea + methanol;
- formic acid; aniline (rare); lead hydroxide;
- t-butanol/ sulphuric acid; acetic acid; ether;
- potassium; cobalt; cobalt oxide; lithium; lithium aluminium hydride; metal oxides (decomposition); metal powders (decomposition); sodium;
- sulphuric acid; vinyl acetate (catalyst); tartaric acid;
- brass; gadolinium hydroxide; catalysts -> decomposition;
- furfuryl alcohol; glycerin; porous substances (cork);
- rust -> decomposition; organic solvents;
- activated carbon (decomposition); lead, iron salts;
- combustible substances; organic substances;
- platinum; dust particles; potassium iodide; copper salts; magnesium;

The substance can react dangerously with:
- potassium permanganate; phosphorus; manganese;
- propionaldehyde; alkali hydroxides; chromium;
- phenol (iron(III)-catalyst); calcium permanganate;
- antimony trisulphide;
- concentrated nitric acid -> decomposition;
- wood; tetrahydrothiopene; tin(II)-chloride;
- clothes; cotton fibres -> self-ignition; carbon powder/manganese dioxide;

**OCCUPATIONAL HEALTH AND FIRST AID**

**TOXIC EFFECTS**

**Annotation:**
At present time the occupational health information for this substance is only available in German. Please consult our database in German.

**FIRST AID**

**Annotation:**
At present time the first aid information for this substance is only available in German. Please consult our
HANDLING AND USAGE

USAGE

The substance is part of:
- cleaning agents and disinfectants
- cosmetics (hair preparations, hair bleach, cold wave fixing agents, hair dyes and skin bleaching agents)
The substance is used for the production of:
- bleaching agents for the detergent industry
- epoxides, peroxide-catalysts, glycerol, softening agents and others
The substance is used for:
- cleaning, detoxification and deodorization of waste water, drinking water and swimming bath water
- bleaching of cellulose and deinking of recovered paper
- cleaning Si-chips in the electronics industry
- etching and pickling of non-ferrous metals

TECHNICAL MEASURES - HANDLING

Workplace:
Provision of good ventilation in the working area.
Install a floor drain.
Washing facility at the workplace required.
Eye bath required. These locations must be signposted clearly.
When handling excessive amounts of the substance an emergency shower is required.

Equipment:
Use only closed apparatus.
If release of the substance cannot be prevented, then it should be suctioned off at the point of exit.
Label containers and pipelines clearly.

Suitable materials:
Pure aluminium (> 99.5%)
Special aluminium-magnesium-alloys
Completely stainless steels (V2A)
Tantalum
Zircon
Borosilicate glass
Porcelain
Polytetrafluoro ethylene PTFE (Teflon)
Preferably for max. concentrations of 60 wt.% :
Polyethylene PE
Polyvinyl chloride

Unsuitable materials:
Copper
Lead  
Brass  
Iron  
Silver  
Bronze  

**Advice on safer handling:**  
Take care to maintain clean working place.  
The substance must not be present at workplaces in quantities above that required for work to be progressed.  
Do not leave container open.  
Use leak-proof equipment with exhaust for refilling or transfer.  
Avoid splashing.  
Fill only into labelled container.  
Never refill excess materials back to the container.  
Avoid any contact when handling the substance.  
H2O2 should be diluted as far as its application allows.  
The addition of H2O2 should only occur via ducts, sluices, pumps that are not used for other substances.  
Do not transport together with incompatible substances.  
Use an appropriate exterior vessel when transporting in fragile containers.

**Cleaning and maintenance:**  
Use protective equipment while cleaning if necessary.  
Regular inspection of leak test required!  
Only conduct maintenance and other work on or in the vessel or closed spaces after obtaining written permission.  
Only work with vessels and lines after they have been thoroughly rinsed.

**TECHNICAL MEASURES - STORAGE**

**Storage:**  
Do not use any food containers - risk of mistake.  
Containers have to be labelled clearly and permanently.  
Store only in the original container.  
Preferably use unbreakable containers rather than glass containers.  
Place fragile vessels in break-proof outer vessels.  
Do not keep the container sealed gas-tight.  
Maximum filling 90%.  

Only manufacturers or specialists can mount the tank units  
The vessels must have equipment for the temperature measurement preferably with alarm.  
The vessels must be equipped with a venting device protected against dust and splashing water.  
Catch pans must be equipped with an water tap so that in an emergency case is water available to dilute and rinse away the peroxide.

Recommended storage temperature:  
approx. 15 degree C  
Keep container in a well-ventilated place.  
Store in a fire resistant place.  
Store smaller vessels in cabinets with collecting tubs.
Install sufficiently large collection rooms (depressions, walls, or stable freestanding walls).  
Protect from exposure to sunlight.  
Protect from overheating/heating up.  
Protect from exposure to light.  

**Conditions of collocated storage:**

For concentrations over or equal 60 % applies:
Storage class 5.1 A (Strongly oxidizing substances)
Only substances of the same storage class should be stored together.
Strongly oxidizing substances according to TRGS 510 appendix 8, must be stored separately. Collocated storage with oxidizing substances of storage class 5.1B and also with noncombustible substances of storage classes 12 and 13 is permitted.

For concentrations less than 60 % till 20 % applies:
Storage class 5.1 B (Oxidizing substances)
Only substances of the same storage class should be stored together.
Collocated storage with the following substances is prohibited:
- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive substances.
- Gases.
- Aerosols (spray bottles).
- Other explosive substances of storage class 4.1A.
- Spontaneously flammable substances.
- Substances liberating flammable gases in contact with water.
- Organic peroxides and self reactive substances.
Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see TRGS 510):
- Flammable liquids of storage class 3.
- Flammable solid substances or desensitized substances of storage class 4.1B.
- Ammonium nitrate and preparations containing ammonium nitrate.
- Combustible and non combustible acutely toxic substances of storage classes 6.1A and 6.1B.
- Combustible toxic or chronically acting substances of storage class 6.1C.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.
- Combustible corrosive substances of storage class 8A.
- Combustible liquids of storage class 10.
- Combustible solids of storage class 11.
The substance should not be stored with substances with which hazardous chemical reactions are possible.

For concentrations less than 20 % applies:
Storage class 8 B (Non-combustible corrosive substances)
Only substances of the same storage class should be stored together.
Collocated storage with the following substances is prohibited:
- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive substances.
- Strongly oxidizing substances of storage class 5.1A.
- Organic peroxides and self reactive substances.
Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see TRGS 510):
- Other explosive substances of storage class 4.1A.
- Spontaneously flammable substances.
- Substances liberating flammable gases in contact with water.
- Ammonium nitrate and preparations containing ammonium nitrate.
The substance should not be stored with substances with which hazardous chemical reactions are possible.
TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

Technical, constructive measures:
Substance is non-combustible, but has an oxidizing effect.
H2O2-vapours may explode if the vapour phase reaches a concentration greater than 40 wt. % at normal pressure.
Fire fighting equipment must be available.
Inspect the electrical fittings regularly against the higher risk of corrosion.

Precaution on handling:
Aqueous solutions up to 90 wt. % H2O2 are not explosive;
solutions of 90-100% may only be brought to an explosion by a strong initial detonation.
Keep at a distance from sources of ignition (e.g. electrical devices, open flames, heat sources, sparks).
Observe the smoking prohibition!
Additionally, for hydrogen peroxide >= 60%:
Absolutely no welding in the working area.

Do not use wolfram-electrodes for electrowelding, traces of it will decompose the H2O2.
Only work with vessels and lines after these have been thoroughly rinsed.
Work done with fire or open flame should only be carried out with written permission if the risk of fire or explosion cannot be completely eliminated.
Keep away from combustible materials.

ORGANISATIONAL MEASURES

Instruction on the hazards and the protective measures using instruction manual (TRGS 555) are required with signature if just more than one minor hazard was detected.
Instruction must be provided before employment and then at a minimum of once per annum thereafter.
An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.
Observe the restrictions on juvenile employment as defined in the "Jugendarbeitsschutzgesetz".
Observe the restrictions on the employment of expectant and nursing mothers as defined in the "Mutterschutzverordnung".

PERSONAL PROTECTION

Body protection:
Depending on the risk, wear a tight, long apron and boots or suitable chemical protection clothing.

Respiratory protection:
In an emergency (e.g.: unintentional release of the substance) respiratory protection must be worn.
Consider the maximum period for wear.
Respiratory protection: Special filter NO - P3, colour code blue-white.
These filters may only be used when in their original condition. For more details on the conditions for use and the maximum concentrations consult the "Regeln für den Einsatz von Atemschutzgeräten" (BGR 190).
(also possible special filter CO)
Respiratory protection: insulating device.
Use for concentrations above the usage limits for filter devices, for oxygen concentrations below 17% volume, or in circumstances which are unclear.

Eye protection:
Sufficient eye protection must be worn. 
Wear chemical safety goggles. 
If the face is at risk as well as the eyes, a protective shield must also be worn. 
If vapours or aerosols that may injure the eyes arise, then safety of the eyes can best be guaranteed by wearing a full mask.

**Hand protection:**
Use protective gloves. The glove material must be sufficiently impermeable and resistant to the substance. 
Check the tightness before wear. Gloves should be well cleaned before being removed, then stored in a well ventilated location. Pay attention to skin care. 
Textile or leather gloves are completely unsuitable. 
The following information refers to hydrogen peroxide (3%, dilution) and hydrogen peroxide (30%, peryhydrol):

The following materials are suitable for protective gloves (Permeation time >= 8 hours): 
Natural rubber/Natural latex - NR (0,5 mm) (use non-powdered and allergen free products) 
Polychloroprene - CR (0,5 mm) 
Nitrile rubber/Nitrile latex - NBR (0,35 mm) 
Butyl rubber - Butyl (0,5 mm) 
Fluoro carbon rubber - FKM (0,4 mm) 
Polyvinyl chloride - PVC (0,5 mm) 
Information on suitable glove materials for higher concentrations of hydrogen peroxide is not available. 
Ask the manufacturer for suitable materials.

The times listed are suggested by measurements taken at 22 °C and constant contact. Temperatures raised by warmed substances, body heat, etc. and a weakening of the effective layer thickness caused by expansion can lead to a significantly shorter breakthrough time. In case of doubt contact the gloves' manufacturer. A 1.5-times increase / decrease in the layer thickness doubles / halves the breakthrough time. This data only applies to the pure substance. Transferred to mixtures of substances, these figures should only be taken as an aid to orientation.

**Skin protection:**
Skin protection preparations do not protect sufficiently against the substance. Wear protective gloves. 
The skin must be washed with soap and water before breaks and at the end of work. 
Apply fatty skin-care products after washing.

**Industrial hygiene:**
Foods, beverages and other articles of consumption must not be consumed at the work areas. Suitable areas are to be designated for these purposes. 
Avoid contact with skin. Do not allow the substance or its solution to dry on the skin. In case of contact wash skin. 
Avoid contact with eyes. In case of contact rinse the affected eye(s). 
Avoid inhalation of vapour or mist. 
Avoid contact with clothing. Contaminated clothes must be exchanged and cleaned carefully. 
Before cleaning clothes rinse thoroughly first in water. 
Provide washrooms with showers and if possible rooms with separate storage for street clothing and work clothing.

**DISPOSAL CONSIDERATIONS**

Hazardous waste according to Waste Catalogue Ordinance (AVV). 
If there is no way of recycling it must be disposed of in compliance with the respective national and local regulations.
Collection of small amounts of substance:
Dilute strongly (concentration of 3% max.) and add to the
effluent. It is best to dilute with 20 parts water, then
neutralize with sodium hydroxide solution (10%).
Alternative:
Convert into a less harmful reduction product by introducing in a sodium thiosulfat solution, if necessary
under acidification.
Place in collecting containers for salt solutions, adjust for a pH value of 6 - 8, or
place in collecting containers for toxic anorganic residues as well as heavy-metal salts and their solutions.
Collection vessels must be clearly labelled with a systematic description of their contents and with the
hazard symbol and the R and S phrases. Store the vessels in a well-ventilated location. Entrust them to
the appropriate authorities for disposal.

ACCIDENTAL RELEASE MEASURES

Evacuate area. Warn affected surroundings.
The hazardous area may only be entered once suitable protective measures are implemented. Only then
can the hazardous situation be removed.
Wear respiratory protection, eye protection, hand protection and body protection (see chapter Personal
Protection).
Take up with an absorbent (absorbent and neutralizer for spilled acids) and dispose of according to
regulations.
Pump off larger quantities.
Dilute small amounts with water and flush.
Afterwards ventilate area and wash spill site.

Endangerment of drinking water and environment:
Maybe a hazard to drinking water sources when very large quantities get into groundwater. Inform the
responsible authorities.

FIRE FIGHTING MEASURES

Instructions:
Substance is non-combustible, but has an oxidizing effect.
In case of ambient fire:
Cool surrounding containers with water spray.
If possible, take container out of dangerous zone.
Rise in pressure and risk of bursting when heating.
Shut off sources of ignition.

REGULATIONS

GHS-CLASSIFICATION AND LABELLING

Classification:
Oxidising liquids, Category 1; H271
Acute toxicity, Category 4, oral; H302
Acute toxicity, Category 4, inhalation; H332
Skin corrosion, Category 1A; H314
Serious eye damage, Category 1; H318
Specific Target Organ Toxicity (single exposure), Category 3; H335

Signal Word: "Danger"

Hazard Statement - H-phrases:
H271: May cause fire or explosion; strong oxidiser.
H302: Harmful if swallowed.
H314: Causes severe skin burns and eye damage.
H332: Harmful if inhaled.
H335: May cause respiratory irritation.

Information by the European Chemicals Agency - ECHA
No P-phrases have been assigned by ECHA.

Source: 07520

The substance is listed in appendix VI, table 3.1 of CLP regulation.

Source: 99999

GHS-CLASSIFICATION OF MIXTURES
Ox. Liq. 1; H271: C >= 70 %
Ox. Liq. 2; H272: 50 % <= C < 70 %
Skin Corr. 1A; H314: C >= 70 %
Skin Corr. 1B; H314: 50 % <= C < 70 %
Skin Irrit. 2; H315: 35 % <= C < 50 %
Eye Dam. 1; H318: 8 % <= C < 50 %
Eye Irrit. 2; H319: 5 % <= C < 8 %
STOT SE 3; H335; C >= 35 %

The general concentration limits from Annex 1 of the Regulation (EU) 1272/2008 are to be used for possible further available substance classifications.

Source: 07500

EUROPEAN CLASSIFICATION

R5
O; R8
C; R35
Xn; R20/22

O Oxidizing
**Risk phrases (R-phrases):**

R 5  Heating may cause an explosion  
R 8  Contact with combustible material may cause fire  
R 20/22  Harmful by inhalation and if swallowed  
R 35  Causes severe burns  

**Note B**

Some substances are placed on the market in aqueous solutions at various concentrations and, therefore, these solutions require different classification and labelling since the hazards vary at different concentrations. When in Part 3 entries with this Note have a general designation of the type 'nitric acid ...%', then the supplier must state the percentage concentration of the solution on the label. Unless otherwise stated, it is assumed that the percentage concentration is calculated on a weight/weight basis.

EU classification according to GHS regulation, appendix VI, table 3.2  
(formerly according to 29th adaption directive 2004/73/EEC).

Source: 07500

**CLASSIFICATION OF MIXTURES**

**Specific Concentration Limits:**

Xn; R20: C >= 50 %  
Xn; R22: C >= 8 %  
C; R35: C >= 70 %  
C; R34: 50 % <= C < 70 %  
Xi; R37/38: 35 % <= C < 50 %  
Xi; R41: 8 % <= C < 50 %  
Xi; R36: 5 % <= C < 8 %  

Footnote:  
O; R8: C >= 50 %  
R5: C >= 70 %  

The general concentration limits from Preparation Directive 1999/45/EU are to be used for possible further available substance classifications.

Source: 07500

**WORKPLACE LABELLING ACCORDING TO GERMAN ASR A1.3**

**Prohibition label:**

No fire, open flame and smoking

**Warning label:**
Caution - corrosive material

Caution - oxidizing material

Precept label:

Use safety goggles

Wear safety gloves

GERMAN WATER HAZARD CLASS

Substance No: 288
WGK 1 - low hazard to waters
Classification according to the Administrative Regulation of Substances Hazardous to Water (VwVwS)

TRANSPORT REGULATIONS

UN Number: 2015
Shipping name: Hydrogen peroxide, stabilized or hydrogen peroxide, aqueous solution with more than 60 % hydrogen peroxide, stabilized
Hazard Identification Number: 559
Class: 5.1 (Oxidizing Agents)
Packing Group: I (high danger)
Danger Label: 5.1/8

Tunnel restrictions:
Transports in tanks: passage forbidden through tunnels of category B, C, D and E.
Other transports: passage forbidden through tunnels of category E.

UN Number: 2014
Shipping name: Hydrogen peroxide, aqueous solution, with 20 % <= Hydrogen peroxide <= 60 %
Hazard Identification Number: 58
Class: 5.1 (Oxidizing Agents)
Packing Group: II (medium danger)
Danger Label: 5.1/8

Tunnel restrictions:
Passage forbidden through tunnels of category E.

UN Number: 2984
Shipping name: Hydrogen peroxide, aqueous solution, with 8 % <= hydrogen peroxide <= 20 %
Hazard Identification Number: 50
Class: 5.1 (Oxidizing Agents)
Packing Group: III (low danger)
Danger Label: 5.1

Tunnel restrictions:
Passage forbidden through tunnels of category E.

RECOMMENDATIONS OF MAK-COMMISSION

This data is recommended by scientific experience and is not established law.

0,5 ml/m³
0,71 mg/m³

Limitation of exposure peaks: Excursion factor 1
Duration 15 min, mean; 4 times per shift; interval 1 hour
Carcinogenic: Category 4
Substances which are carcinogenic with no or minor genetically toxical effects. If there is a MAK-value for these substances no considerable contribution to the hazard of cancer will be expected.

Pregnancy: Group C
There is no reason to fear a risk of damage to the developing embryo or foetus when MAK and BAT values are adhered to.

Source: 08096

GERMAN ORDINANCE OF FAILURE
Annex I - No: 3

Threshold for operating range to §1 sec. 1
- Record 1: 50000 kg
- Record 2: 200000 kg

Scope: oxidising substances

Please note: In the GESTIS database only the lowest amount threshold of a substance is given. If a substance has several classifications, use must be made of the amount threshold from appendix I which corresponds to the respective classification.

RESTRICTIONS OF USE / BANS OF USE

Annex XVII, Point 3
1. The putting into circulation and the utilisation of the substance is not allowed in decorative objects, games and joke articles.
2. Substances labelled with R 65 which can be utilised as fuels in decorative lamps and are put in circulation in amounts of 15 l or less must not contain a dye and/or a perfume.

Further information on prohibitions can be taken from the regulation.

Prohibitions of Chemicals Ordinance; status - November 2010
Annex to §1, Section 5

Directives on Safety in School (GUV-SI 8070); status - March 2003
Attachment 1 to GUV-SR 2004
Experiments with this substance conducted by pupils are not prohibited but the checking for substitutes is of special importance.

Consumer Goods Ordinance; status - February 2011
Attachment 1 to § 3, Point 5
The substance must not be utilised for the production or treatment of joke articles.

FURTHER REGULATIONS

TRGS 200
Einstufung und Kennzeichnung von Stoffen, Zubereitungen und Erzeugnissen; Ausgabe Februar 2007, berichtet Februar 2010, mit Änderungen und Ergänzungen August 2010

TRGS 201
Einstufung und Kennzeichnung von Abfällen zur Beseitigung beim Umgang; Ausgabe Juli 2002

TRGS 400
Gefährdungsbeurteilung für Tätigkeiten mit Gefahrstoffen; Ausgabe Januar 2008

TRGS 555
Betriebsanweisung und Information der Beschäftigten; Ausgabe Februar 2008; geändert und ergänzt Juli 2009

TRGS 600
Substitution; Ausgabe August 2008

TRGS 401
Gefährdung durch Hautkontakt, Ermittlung - Beurteilung - Maßnahmen; Ausgabe Juni 2008; berichtigt Februar 2010

**TRGS 500**
Schutzmaßnahmen; Ausgabe Januar 2008, ergänzt Mai 2008

**TRGS 510**
Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Oktober 2010

**TRGS 800**
Brandschutzmaßnahmen; Ausgabe Dezember 2010