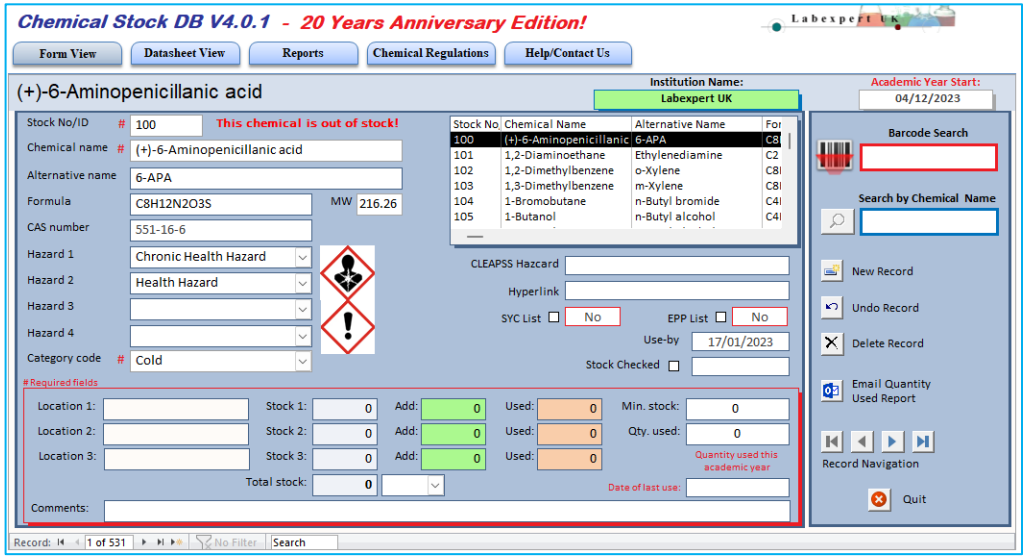
SLS SELECT EDUCATION / **LABEXPERT UK WEBINAR**

How to Store & Secure Your Chemicals

Date: Thursday 8th February

Time: 1:30 to 3:15pm



CHEMICAL STORAGE

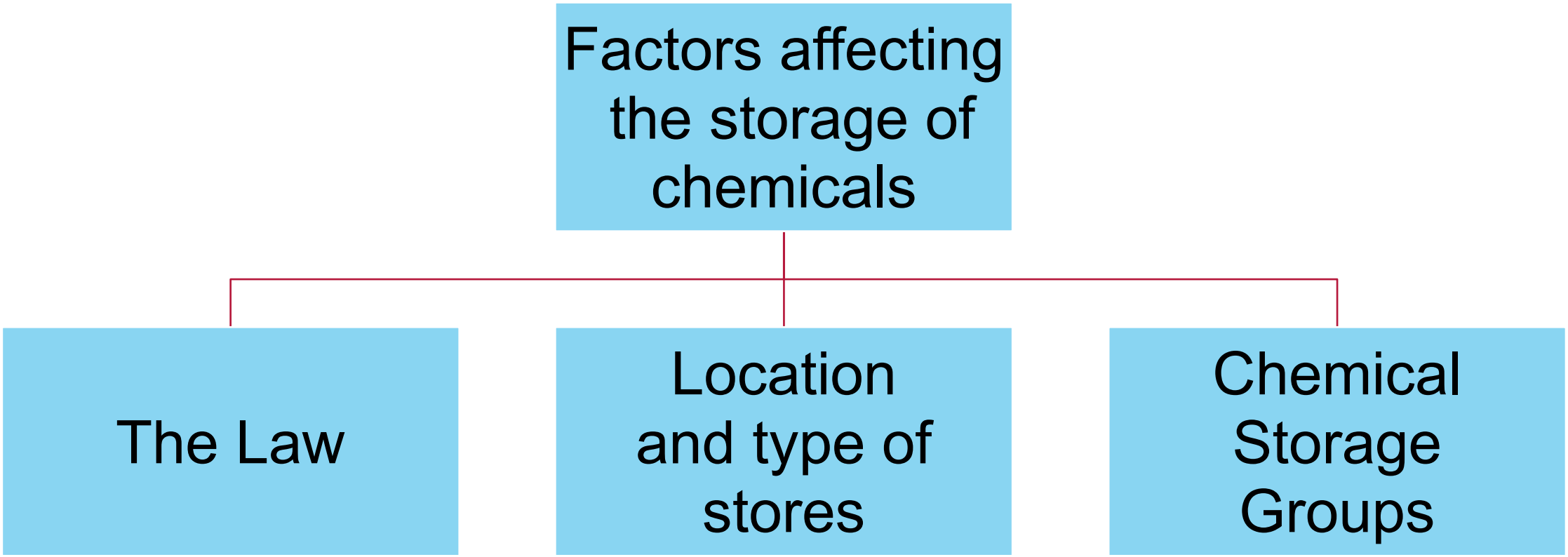
Chris Pambou

Chief Science Technician @ City and Islington College

Developer of Labexpert Stock Control Software

www.Labexpert.co.uk

CHEMICAL STORAGE



LAWS AND REGULATIONS

- **The Health and Safety at Work (HSW) Act (1974)**

  Places duties on employers and on employees, requires every employer to keep the workplace environment safe and healthy.

- **The Workplace (Health, Safety and Welfare) Regulations 1992**

  These regulations set out general requirements for providing a safe and healthy working environment with respect to ventilation, temperatures, lighting, cleanliness and waste materials, store dimensions and space, flooring and access within the store.

- **The Management of Health & Safety at Work Regulations 1999**

  Make more explicit what employers are required to do to manage health and safety. The main requirement on employers is to carry out risk assessments to health and safety to which employees and others are exposed, to record significant findings and to review these assessments periodically. To provide employees with comprehensive and relevant information on risks, specific safety measures and procedures to be followed.

LAWS AND REGULATIONS

- **Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002**
- These Regulations have replaced the '*Highly Flammable Liquids and Petroleum Gases Regulations*'.
- DSEAR puts duties on employers to protect people from risks to their safety from fires, explosions and similar events in the workplace, this includes members of the public who may be put at risk by work activity.
- **What are dangerous substances?**
- Dangerous substances are any substances used or present at work that could, if not properly controlled, cause harm to people as a result of a fire or explosion. They can be found in nearly all workplaces and include such things as solvents, paints, varnishes, flammable gases, such as liquid petroleum gas (LPG), dusts from machining and sanding operations and dusts from foodstuffs.

LAWS AND REGULATIONS

- **What does DSEAR require?**
- Employers must find out what dangerous substances are in their workplace and what the fire and explosion risks are;
- put control measures in place to either remove those risks or, where this is not possible, control them;
- put controls in place to reduce the effects of any incidents involving dangerous substances;
- prepare plans and procedures to deal with accidents, incidents and emergencies involving dangerous substances;
- make sure employees are properly informed about and trained to control or deal with the risks from the dangerous substances;
- identify and classify areas of the workplace where explosive atmospheres may occur and avoid ignition sources (from unprotected equipment, for example) in those areas.

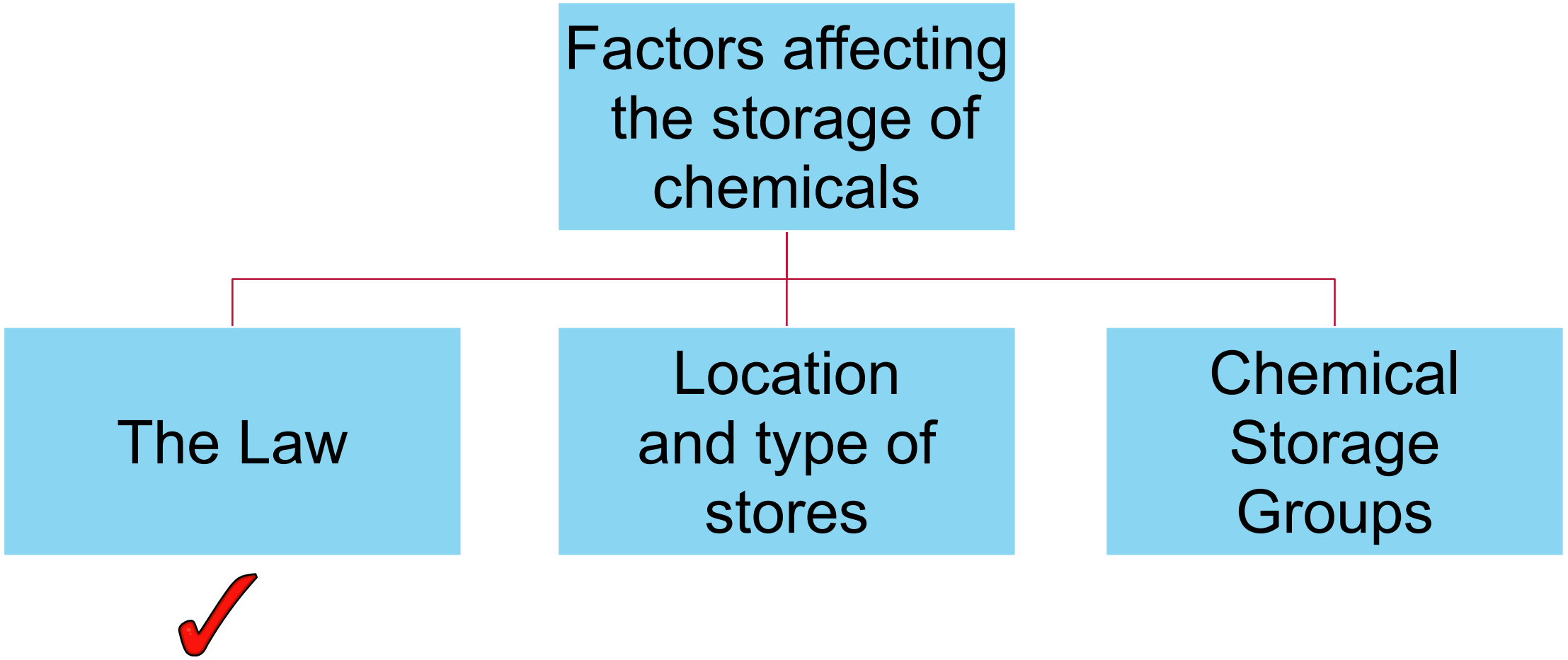
LAWS AND REGULATIONS

- **Petroleum Acts**
- The Petroleum Acts only apply to premises storing more than 15 litres of petroleum spirit (hydrocarbons with a flash point of less than 23^{o}C). Science departments are unlikely to exceed this limit.

- **Gas Cylinders**
- Gases or liquefied gases are covered by DSEAR. If schools only have a single cylinder of each gas kept ready for use will not be regarded as storing them. *(Cylinders should be kept away from highly flammable liquids in a well-ventilated secure place).*

- **Manual Handling Regulations**
- The Manual Handling Operations Regulations may restrict the locality of a chemical store if the movement of chemicals will present a hazard to health and safety.

CHEMICAL STORAGE

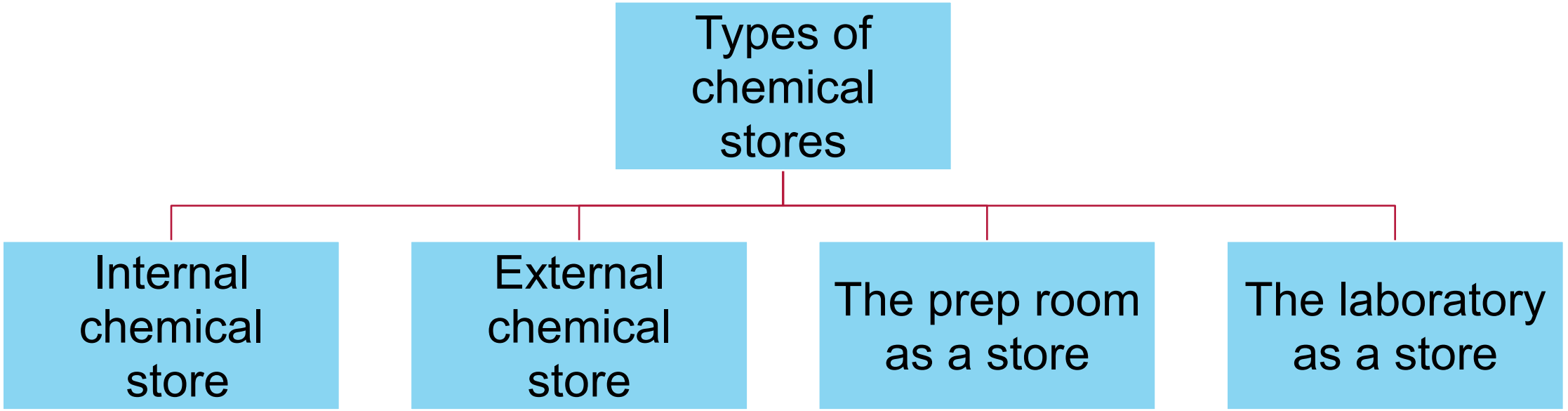


CHEMICAL STORAGE

- How chemicals are stored to a large extent will depend on the layout of the school / college.

- New designs should have a central store within or adjacent to the prep room but in existing buildings very often is a case of compromise with available facilities.

CHEMICAL STORAGE



INTERNAL CHEMICAL STORAGE

- An internal chemical store within the preparation room with fire resistance of at least 30 minutes will accommodate all groups of chemicals except radioactive stock and gas cylinders and will be most desirable.

- Highly flammable liquids can be stored in flammables cabinets with a maximum of 50 litres in any one room.

EXTERNAL CHEMICAL STORAGE

Advantages

- Flammable liquids stored away from main building.
- Large quantities of flammable can be stored
- Enables bulk buying

  (Is this necessary?)
- Cheaper to provide

Disadvantages

- Access to chemicals is inconvenient and less safe. Will eventually lead to the creation of unofficial internal stores.
- Weather conditions affect chemicals, pressures can build up in hot weather and freezing in the winter.
- Containers deteriorate and labels become unreadable.
- Stock examined less frequently leading to deterioration and possible hazards.
- Vandalism

THE PREP ROOM AS A STORE

- Inevitably every prep room will be used as a chemical store, whether this be for storing the bulk of a departments chemicals or just working solutions.



THE PREP ROOM AS A STORE

- The prep room is usually the place of work of one or more technicians and therefore separation of the working area from the storage section is a priority.

- **Main considerations:**
- Size and available space
- Security
- Ventilation

THE LABORATORY AS A STORE

- Teaching laboratories should not be used for the storage of chemicals but if this unavoidable due to lack of space the chemicals must be securely locked up.

- If prepared solutions are stored in the lab due to working practises or again to storage limitation a formal risk assessment must be carried out by head of department and available for inspection. Considerations of the risks, hazards of chemicals, the age of students and supervision available in particular lab should be assessed.

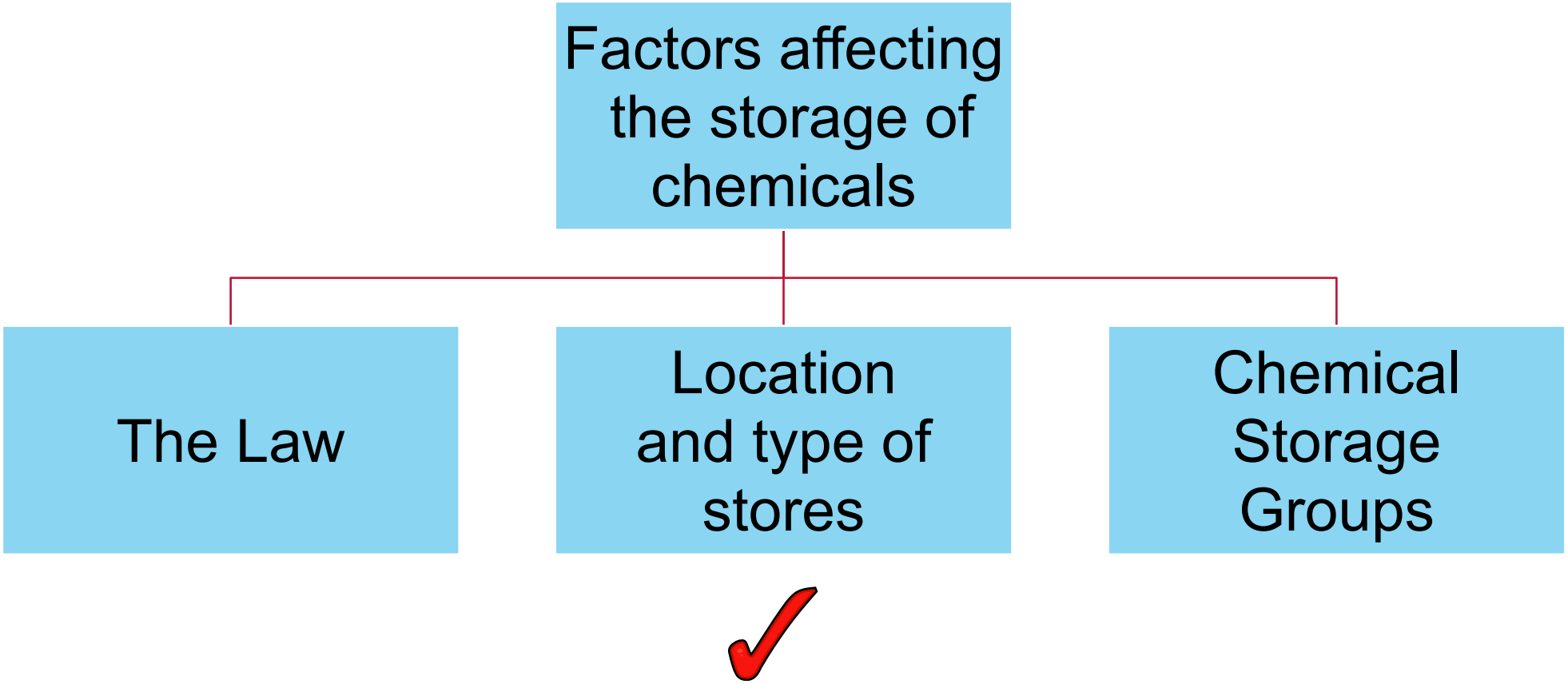
CHEMICAL STORE REQUIREMENTS

- **Good security with door been able to unlock from the inside and preferably opening outwards with a vision panel.**
- **Ventilation - should normally be forced extraction, it needs to be capable of 2 air changes per hour (BB101).**
- **Good lighting reduces possible errors (flame proof fittings).**
- **Floor slopping away from door made from concrete, quarry tiles or continuous vinyl flooring with sealed edges. (No drain in the floor that would allow hazardous chemicals to enter drain systems).**

CHEMICAL STORE REQUIREMENTS

- **Shelves - (avoid deep shelves and placing bottles above eye level).**
- **Running water may be helpful in emergencies.**
- **Spill Kit.**
- **No voids or false ceilings (spread of fumes, smoke or fire).**
- **No radiators or heating pipes.**

CHEMICAL STORAGE



CHEMICAL STORAGE GROUPS

- Different chemicals have different storage requirements and by dividing the chemicals into groups, chemicals within each group can be stored together and different groups can be kept apart within the store.

- The storage groups used here and recommended is the ones used by CLEAPSS and the ASE and have been accepted by the Health and Safety Executive.

- All technicians as well as science teachers will need to know the groups used.

CHEMICAL STORAGE GROUPS

Category	Code	Group	How to store	Keep away from
General chemicals	GIn	Inorganic	Internal store	
	GOrg	Organic	Internal store	
	Ox	Oxidising	Internal chemical store with inorganics	FL, FS, FW, GOrg, CL
Corrosive substances	CLa	Liquids acid	Internal chemical store at low level in trays	CLb, FW, T
	CLb	Liquids non-acid	Internal chemical store at low level in trays	CLa, FW, T
	CS	Solids	Internal chemical store with inorganics	
	CW	Water-reactives	Exclusive ventilated cupboard or desiccators with desiccant and soda lime	FW
Flammable substances	FL	Liquids	Fire resistant cupboard in chemical store	Ox, T
	FS	Solids	Internal chemical store	Ox, CL, FL
	FW	Water reactives	Special box or locked cupboard	

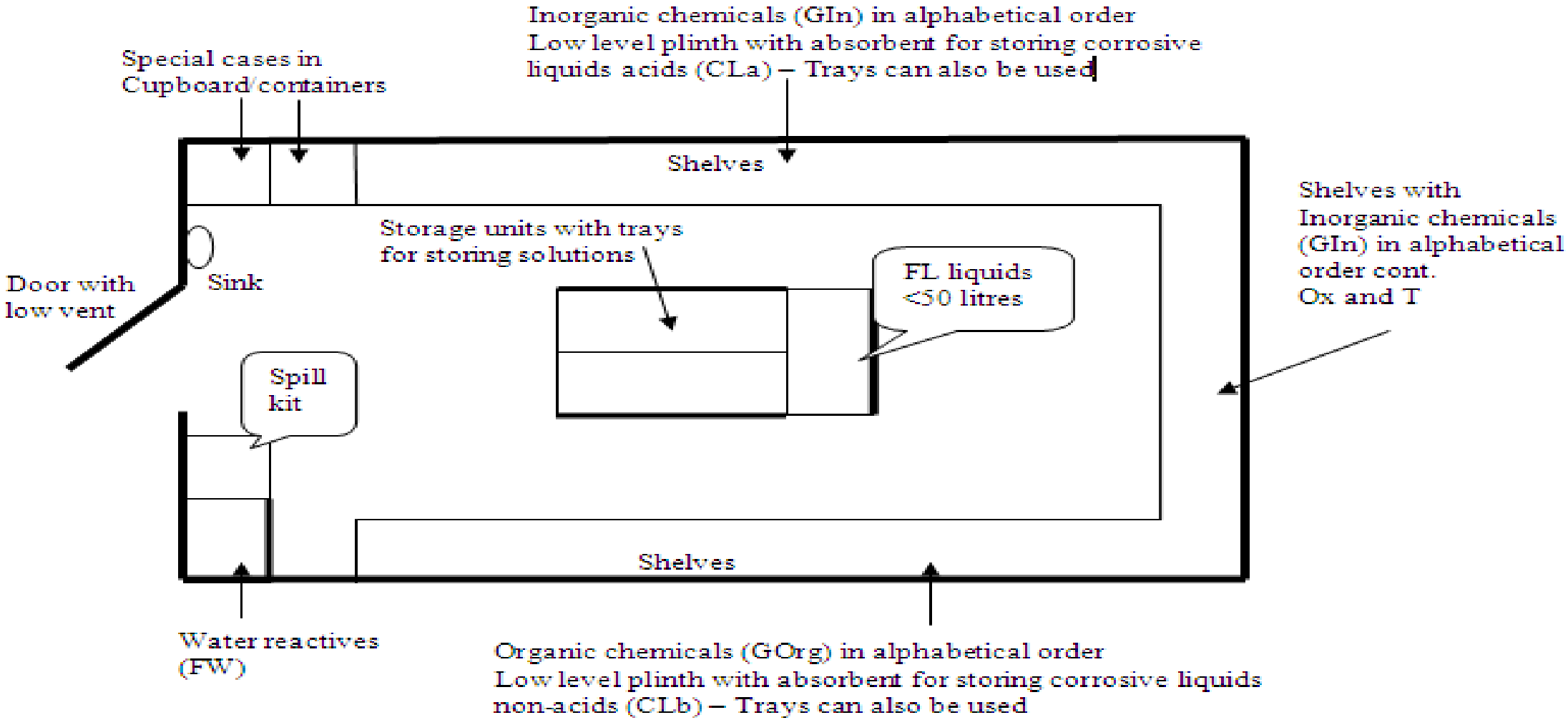
CHEMICAL STORAGE GROUPS

Category	Code	Group	How to store	Keep away from
Toxic substances	T	Toxic	Internal chemical store or locked cupboard	FL
Enzymes	Cold	Enzymes	Keep in refrigerator	

Special cases are the most awkward chemicals to store and require special consideration and regular checks

Special cases	Spec	Bromine	With CW and soda lime to absorb fumes (sodium carbonate and 1M sodium thiosulphate to hand)..	FW
		Silicon tetrachloride	In dessicator or container with silica gel	
		White phosphorus	In water in locked cupboard in store (check regularly that is under water).	Ox, FW
		Radioactive substances	In metal cupboard in locked room or second cupboard away from flammables and not near any position where one person works.	FL, CLa, CLb

ARRANGING CHEMICALS



TYPICAL SHELF ARRANGEMENT

For safety, no shelves above eye level height.

Narrow shelves at the top and wider shelves lower down with bigger space apart.

Acids stored in trays.

Spot any deliberate mistakes



TYPICAL SHELF ARRANGEMENT



Larger bottles



Acids in spill trays

STORING ACIDS

Appropriate size tray for the number of bottles

Plinth protects bottles from being kicked




Kartel

HAZARD SYMBOLS

- **NEW CLP REGULATION 1272/2008/EC (implementing GHS)**

WHAT IS CLP

- **Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on Classification, Labelling and Packing (CLP) of substances and mixtures, amending and repealing Directive 67/548/EEC (i.e.DSD) and 1999/45/EC (i.e DPD) and amending Regulation No 1907/2006 (i.e. REACH) came into force on 20 January 2009**

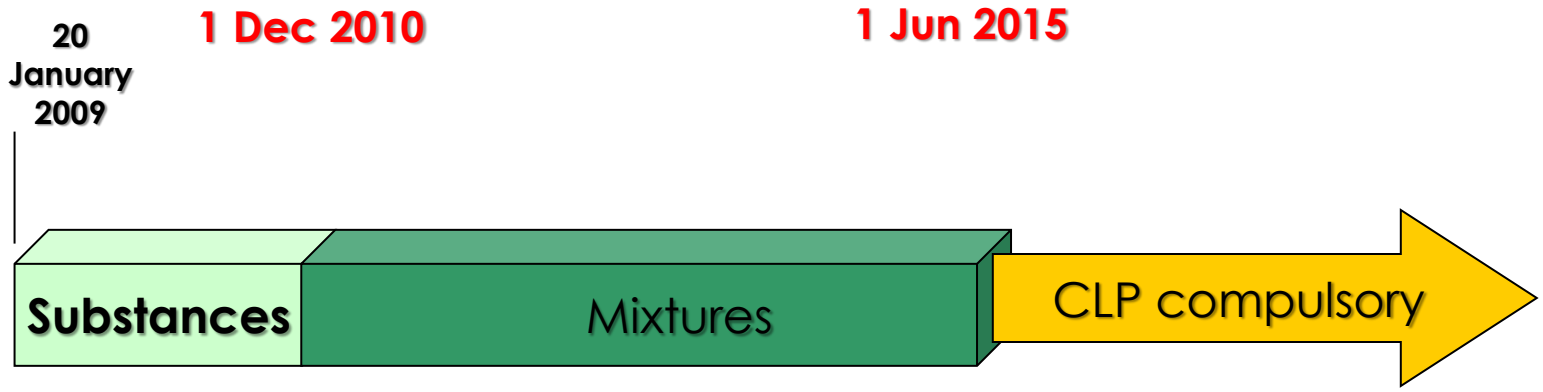
- **Implements Globally Harmonised System (GHS) of Classification and labelling in the EU**

- **Covers all 27 EU and EEA countries**

CRITICAL CLP TIMELINES

1 Dec 2010

Target date - CLP of substances mandatory



1 June 2015

Target date - All mixture must be reclassified and labelled in accordance with CLP (GHS)

NEW WORDING IN THE CLP, COMPARISON WITH TODAY:

New CLP -Regulation	Current EC-directives
Mixture	**Preparation**
GHS-pictogram	**Symbol**
H-phrase or -statement	**R-phrase**
P-phrase or -statement	**S-phrase**

CLP PICTOGRAMS



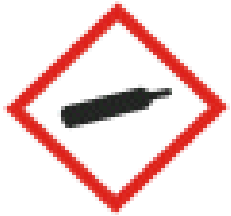
Exploding bomb



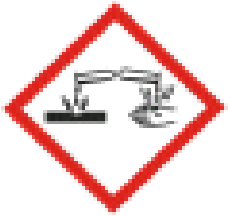
Flame



Flame over circle



Gas cylinder



Corrosion



Skull and crossbones



Exclamation mark



Danger to health



Environment

CLP PICTOGRAMS

- GHS-01
- Explosive





- Self reactive substances and mixtures, Types A, B

- Organic peroxides, Types A,B

CLP PICTOGRAMS

- GHS-02
- Flammable





F+



F

- Flammable gases, aerosols, liquids or solids
- Self reactive substances and mixtures
- Pyrophoric liquids and solids
- Self-heating substances and mixtures
- Substances and mixtures, which in contact with water emit flammable gases
- Organic peroxides

CLP PICTOGRAMS

- GHS-03
- Oxidising





- Oxidising gases, liquids and solid

CLP PICTOGRAMS

- GHS-04
- Gases



- Compressed gases
- Liquefied gases
- Refrigerated liquefied gases
- Dissolved gases No corresponding symbol

CLP PICTOGRAMS

- GHS-05
- Corrosive





- Corrosive to metals
- Skin corrosion
- Severe eye damage

CLP PICTOGRAMS

- GHS-06
- Acute Toxicity





T+



- Acute Toxicity



Xn

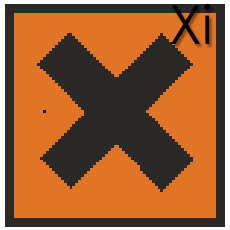
CLP PICTOGRAMS

- GHS-07
- Health Hazard





- Acute Toxicity Skin and eye irritation
- Skin sensitisation
- Specific Target Organ Toxicity
- Respiratory tract irritation
- Narcotic effects



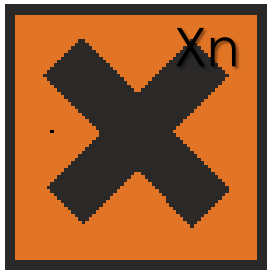
CLP PICTOGRAMS

- GHS-08
- Chronic Health Hazard



- Respiratory sensitisation
- Germ cell mutagenicity
- Carcinogenicity
- Reproductive toxicity
- Specific Target Organ Toxicity
- Aspiration hazard





CLP PICTOGRAMS

- GHS-09
- Hazardous to the aquatic environment





HAZARD PRECAUTIONARY STATEMENTS

- **Hazard statements - they replace R-phrases.**

  They are intended to form a set of standardised phrases about the hazards of chemical substances and mixtures that can be translated into different languages.

- **Precautionary statements - they replace S-phrases.**

  They are intended to form a set of standardised phrases giving advice about the correct handling of chemical substances and mixtures, which can be translated into different languages.

EXAMPLE: HAZARD LABEL FOR HEPTANE (ISO-HEPTANE) ACCORDING TO THE NEW CLP-REGULATION

Danger

- **H225: Highly flammable liquid and vapour.**
- **H304: May be fatal if swallowed and enters airways.**
- **H315: Causes skin irritation.**
- **H336: May cause drowsiness or dizziness.**
- **H410: Very toxic to aquatic life with long lasting effects.**



- **P210: Keep away from heat/sparks/open flames/hot surfaces. – No smoking.**
- **P261: Avoid breathing dust/fume/gas/mist/vapours/spray.**
- **P280: Wear protective gloves/protective clothing/eye protection/face protection.**
- **P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.**
- **P302+P352: IF ON SKIN: Wash with plenty of soap and water.**
- **P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.**
- **P273: Avoid release to the environment.**

UNDERSTANDING CLP INFORMATION

Homepage - ECHA (europa.eu)

Understanding CLP - ECHA (europa.eu)

Understand the labels - Chemicals In Our Life - ECHA (europa.eu)

CLP quiz - ECHA (europa.eu)

CAS NUMBER

Chemical **A**bstracts **S**ervice number is assigned to a substance when it enters the CAS Registry database. Numbers are assigned in sequential order.

(A division of the American Chemical Society)

EINECS NUMBER
EUROPEAN COMMISSION SYSTEM FOR NUMBERING CHEMICALS

European Inventory of Existing Commercial Substances (EINECS)

CHEMICAL STORES

WHAT TO LOOK OUT AFTER A LONG SHUTDOWN
AND CHEMICAL STORAGE

WHAT TO DO FIRST

You shouldn’t be alone when checking the chemical store for the first time back, in case there are any spillages/fumes or other hazards. Make sure is safe to enter.

WHAT TO CHECK

- Check ventilation
- Look out for any leaks
- Check the condition of chemical bottles

  (CLEAPSS guide GL246)
- Missing labels
- Extensive corrosion on metal surfaces

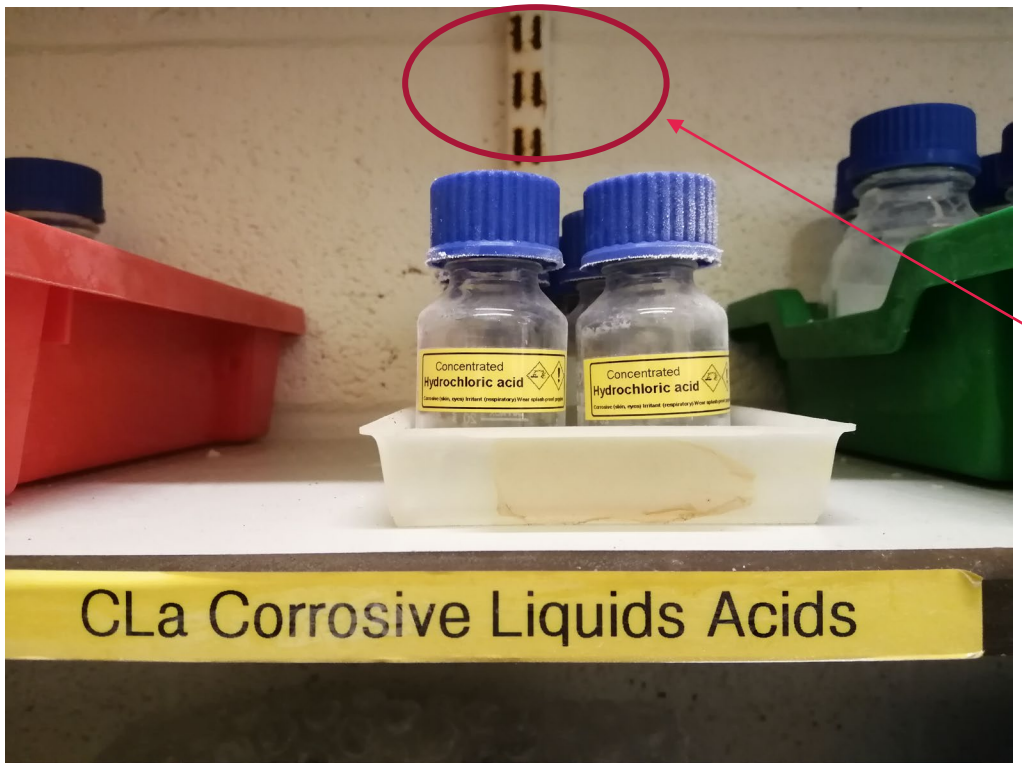
WHAT TO CHECK

- Use your chemical stock list to check the quantities of chemicals are as you left them.

www.labexpert.co.uk

FREE DEMO WEBINARS AVAILABLE

CONDITION OF STORE



HYDROCHLORIC ACID (Concentrated)

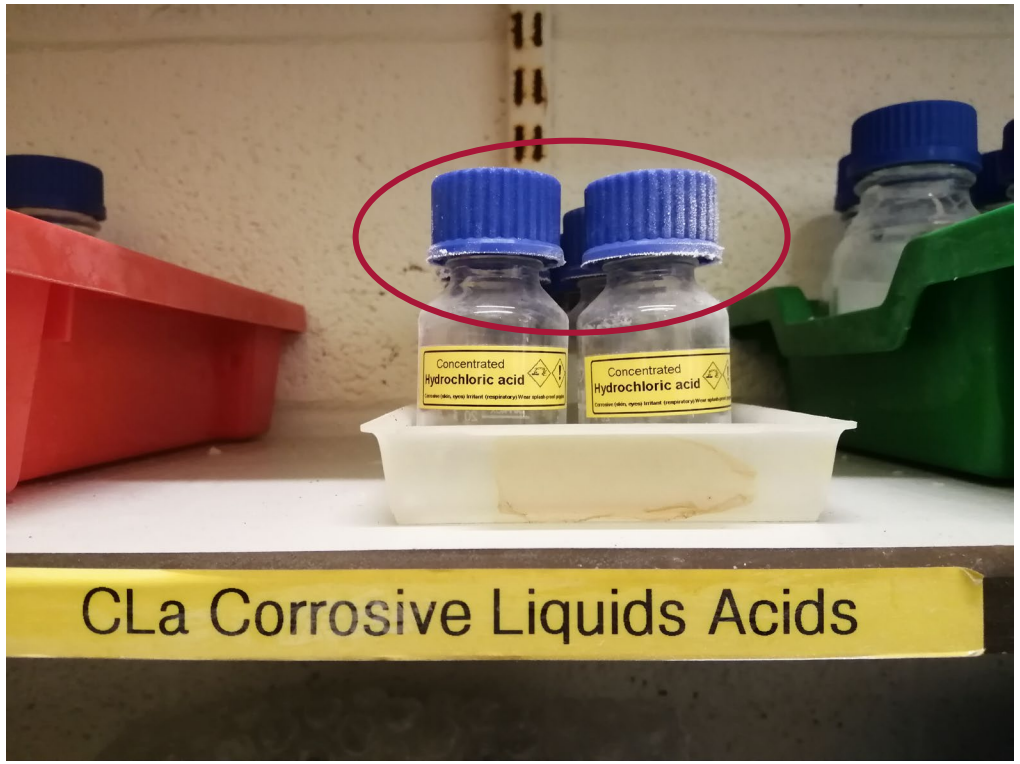
Once bottles are open, hydrogen chloride gas can leak out into the store and accelerate metal corrosion.

Firmly close bottles after use

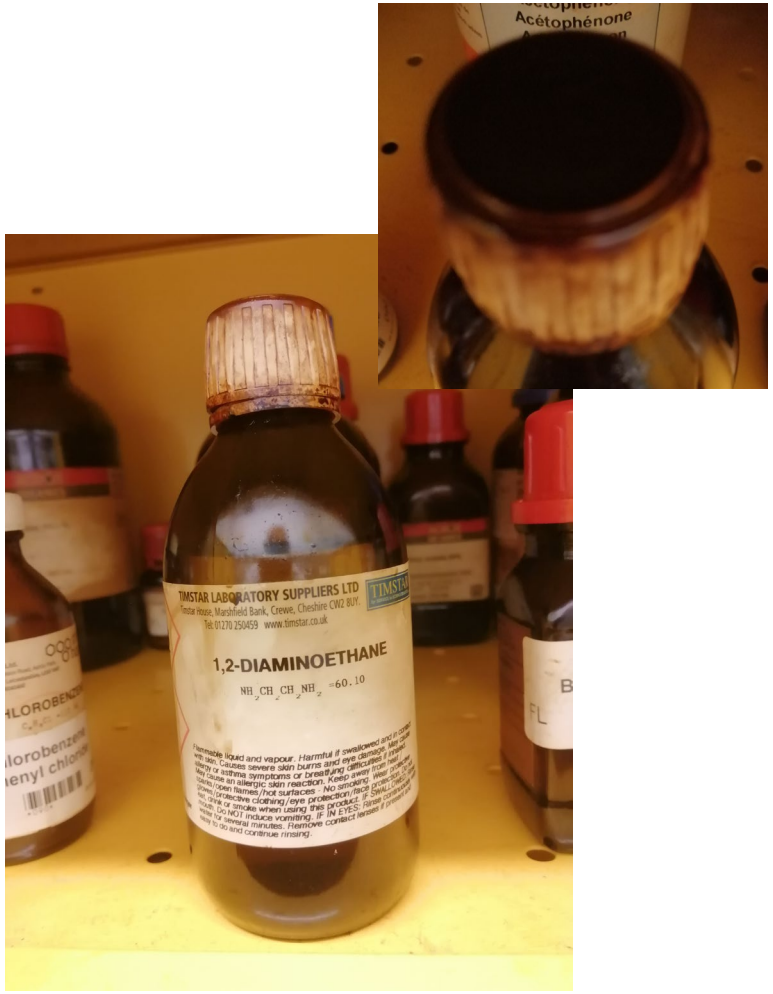
CONDITION OF CHEMICALS

Hydrogen chloride gas reacts with ammonia and amines. A white powder (chloride salts) will deposit on bottles and elsewhere in the chemical store indicating

- leaking bottles or lids
- acid or ammonia/amine vapours diffusing through plastic bottles
- inadequate ventilation in the store



CHECKING BOTTLES

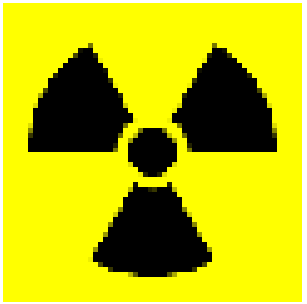


Bottle screw top has degraded/leaking - a common occurrence with amines.

Check and replace as required.

RADIOACTIVITY







Check radioactive store, cupboard and sources.

LABEXPERT STOCK CONTROL SOFTWARE

CHEMICALS

- Pre-loaded with 530 chemicals with all relevant safety and storage information
- Link to CLEAPSS HazCards©
- Continuously up-dated lists of all your chemicals
- Identifies chemicals that need re-ordering when levels are low
- Lists chemicals causing most concern as in Home Office SYC guidance
- Used-by date for each chemical
- Quantities used in academic year with date of last use
- Build-in reports (25)
- Dynamic search with either IUPAC or traditional name
- Optional bar code reading
- Connect to label printers for custom labels
- One-off payment (no subscription)
- Multi-user (site license)

LABEXPERT CHEMICAL STOCK

ALL CHEMICALS REPORT

Labexpert UK

All Chemicals Report

Stock Number	Chemical name	Location 1	Stock 1	Location 2	Stock 2	Location 3	Stock 3	Total stock	g or cm3	Hazard 1	Category code	SYC List
100	(+)-6-Aminopenicillanic acid	Chem store	100		0		0	**100**	g	Chronic Health Ha	Cold	No
101a	1,2-Diaminoethane	Chem store	200		0		0	**200**	Cm3	Flammable	CLa	No
101	1,2-Diaminoethane	Chem store	200		0		0	**200**	Cm3	Flammable	FL	No
102	1,2-Dimethylbenzene	Chem store	800	Chem prep	0		0	**800**	Cm3	Flammable	FL	No
143	Agar	chem 123	100		0		0	**100**	g		GOrg	No
459	Nitric acid conc	Chem store	3500	Chem prep	0	Bio prep ro	0	**3500**	Cm3	Corrosive	CLa	Yes
595	Sulphuric acid, concentrated	Chemstore	100		0		0	**100**		Corrosive	CLa	Yes

We offer FREE DEMO and Q&A sessions via live webinar platforms

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Acknowledgements:

CLEAPSS
http://science.cleapss.org.uk/