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Centre universitaire
de médecine générale
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Case study: Chemical pollutants - properties

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Risk of explosion in laboratory refrigerators

Storage of solvents in laboratory refrigerators

Isopropanol is a solvent commonly used in laboratory and industry

Boiling Temp.: 82.5 ° C

Flash point: 11.7 ° C

LEL : 2,5 % vol,

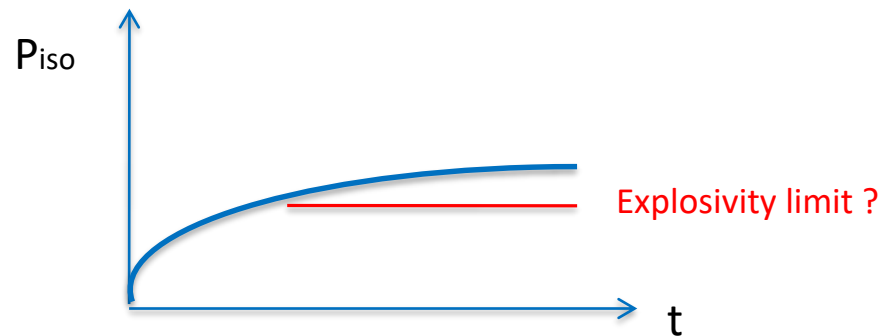
UEL : 12,0 % vol

Vapor pressure (25° C): 4,4 kPa

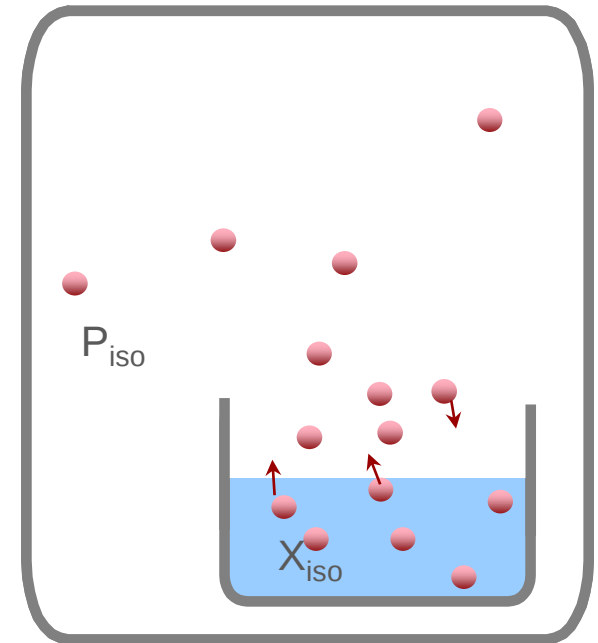


Risk of explosion in laboratory refrigerators

- **What happens inside the refrigerator:**
The lack of air exchange will cause a gradual increase in concentration of isopropanol in the air (by evaporation).



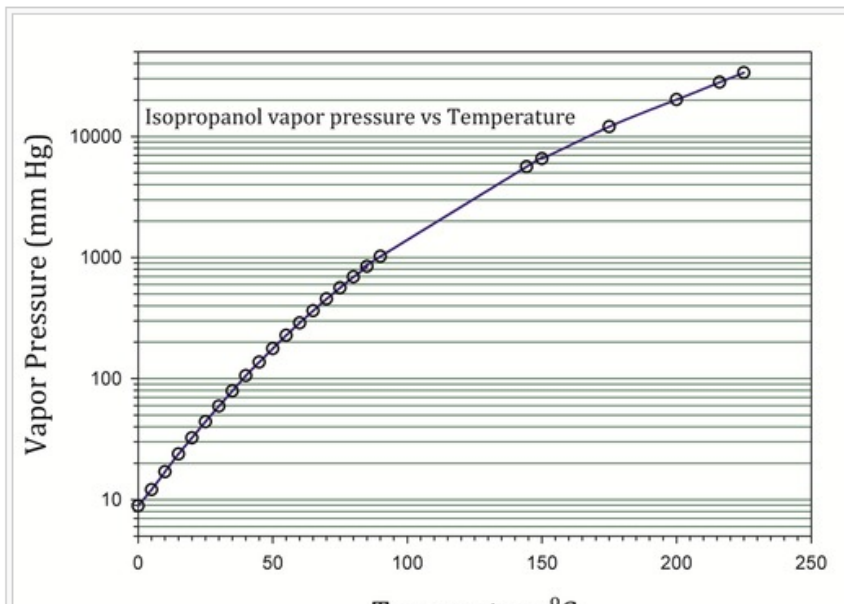
The maximum concentration reached will correspond to the equilibrium situation (saturating vapor pressure).



Risk of explosion in laboratory refrigerators

P in mm Hg	1	10	40	100	400	760	1520	3800	7600	15200	30400	45600
T in °C	-26.1	2.4	23.8	39.5	67.8	82.5	101.3	130.2	155.7	186.0	220.2	—

Table data obtained from *CRC Handbook of Chemistry and Physics* 44th ed.



- For a freezer at -8°C

Considering a linear relation at low Temp. between vapor pressure and temperature. $P_{\text{iso}}(-8^{\circ}\text{C}): 6.7\text{ mmHg}$.

Risk of explosion in laboratory refrigerators

- Conclusion

The temperature of the refrigerator is below the flash point of isopropanol.

- The partial pressure of isopropanol is 980 Pa, or a little less than 1% by volume.
- Under these conditions (except for the failure of the refrigerator), the formation of a flammable mixture is **not possible!**