MIXTURES AND DILUTIONS

MIXTURES

Mixtures are the product of a mechanical blending or mixing of chemical substances like elements and compounds, without chemical bonding or other chemical change so that each ingredient substance retains its own chemical properties and makeup. Nonetheless, despite there are no chemical changes to its constituents, the physical properties of a mixture, such as its melting point, may differ from those of the components. Some mixtures can be separated into their components by physical (mechanical or thermal) means. Zoetrope's can be considered as a kind of mixture which usually pose considerable difficulties regarding the separation processes required to obtain their constituents (physical or chemical processes or even in a blend form).

Mixtures can be either homogeneous or heterogeneous. A homogeneous mixture is a type of mixture in which the composition is uniform. A heterogeneous mixture is a type of mixture in which the components can easily be identified, as there are two or more phases present.

A cooling bath is a mixture used in a laboratory when low temperatures are needed, for example to conduct low-temperature chemical reactions (such as when kinetic control of the reaction is desired), to collect highly volatile liquids from distillation or in cold traps. It usually consists of a solid that melts or sublimes at a low temperature or a liquid that boils at a low temperature, mixed with some other substance that modulates the temperature of the bath or improve heat conduction.

FREEZING MIXTURES

Component	Additive	Achievable temperature
100g water	100g ice	0°C
100g water	29.9g ammonium chloride	-3°C
100g water	75.4g sodium nitrate	-5°C
100g ice	28.2g barium chloride	-7°C
100g water	35.1g sodium chloride	-10°C
100g water	244.4g calcium chloride hexahydrate	-12°C
100g water	132.6g ammonium thiocyanate	-16°C
100g ice	61.3g ammonium sulphate	-19°C
100g ice	29.9g sodium chloride	-21°C
100g ice	81.8g calcium chloride hexahydrate	-22°C
100g ice	63.9g sodium bromide	-28°C
100g ice	magnesium chloride	-33°C
100g powdered ice	92.3g 66.1% sulphuric acid	-37°C
100g ice	122.2g calcium chloride hexahydrate	-40°C
100g ice	143.9g calcium chloride hexahydrate	-55°C
alcohol	solid carbon dioxide	-72°C
chloroform	solid carbon dioxide	-77°C
acetone	solid carbon dioxide	-86°C
ether	solid carbon dioxide	-100°C

DILUTIONS

ACIDS

3 molar. Use the amount of concentrated acid indicated and dilute to one litre.

Acetic acid, 3N.
Use 172ml of 17.5M acid (99-100%).

Hydrochloric acid, 3N.
Use 258ml of 11.6M acid (36% hydrochloric acid).

Nitric acid, 3N.
Use 195ml of 15.4M acid (69% nitric acid).

Orthophosphoric acid, 9N.
Use 205ml of 14.6M acid (85% orthophosphoric acid).

Sulphuric acid, 6N.
Use 168ml of 17.8M acid (95% sulphuric acid).

Always add acid to water otherwise the water will float on the acid, start boiling and cause splattering of concentrated acid.

When mixing low acids, always add the stronger acid to the weaker, for the reason described above. As a memory aid for the right order remember "3A's – Always Add Acid".

BASES

Ammonium hydroxide, 3M, 3N.
Dilute 200ml of concentrated solution (14.8M, 28% ammonia) to 1 litre.

Barium hydroxide, 0.2M, 0.4N.
Saturated solution, 63g per litre of barium hydroxide octahydrate. Use some excess, filter off barium carbonate and protect from carbon dioxide of the air with soda lime or ascarite in a guard tube.

Calcium hydroxide, 0.02M, 0.04n.
Saturated solution, 1.5g per litre of calcium hydroxide. Use some excess, filer off calcium carbonate and protect from carbon dioxide of the air.