INKCHEMISTRY FLASHCARDS

# Working in the laboratory

Unit C00 · 33 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions to learn and misconceptions to correct. These cards, and a check-yourself question for every lesson, run on the website with spaced-repetition scheduling, at inklearning.co.uk/chemistry/flashcards.

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DEFINITION

Define: Resolution.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Uncertainty.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Parallax error.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Percentage uncertainty.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Accuracy.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Precision.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Random error.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Systematic error.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

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DEFINITION

The interval within which the true value of a measurement can be expected to lie, written as ± a value in the unit of the measurement.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

The smallest change in the quantity being measured that gives a change in the reading on the instrument.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

The absolute uncertainty of a measurement divided by the measured value, multiplied by 100.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

An error in reading a scale caused by viewing it from an angle instead of with the eye level with the mark or meniscus being read.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Results are precise when repeated measurements are close to one another, with little spread about the mean.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

A measurement or result is accurate when it is close to the true value.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

An error that shifts every reading from the true value in the same direction by a similar amount; repeating the measurement neither reveals it nor reduces it.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

An error that makes repeated readings scatter unpredictably on both sides of the true value; its effect is reduced by repeating the measurement and taking a mean.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

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DEFINITION

Define: Concordant results.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Anomalous result.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

SPOT THE ERROR

Say what is wrong with this claim:

If my titres all agree with each other, my answer must be right.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

DEFINITION

Define: Standard solution.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Weighing by difference.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Heating under reflux.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Distillation.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Filtrate.

APPARATUS, TECHNIQUES AND SAFETY

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**DEFINITION**

A result that does not fit the pattern of the others, such as a titre outside the concordant set, and is left out of the mean.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

**DEFINITION**

Titres that agree within 0.10 $cm^3$ of each other, from which the mean titre is calculated.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

**DEFINITION**

A solution whose concentration is known accurately, made by dissolving a known mass of solute and making it up to a known volume.

APPARATUS, TECHNIQUES AND SAFETY

**SPOT THE ERROR**

Concordant titres show precision, not accuracy. A pipette rinsed with water, or an acid stronger than its label, shifts every titre the same way: the repeats agree and the answer is still wrong. Agreement rules out random error only; the uncertainty of the apparatus and a comparison with a known value are what say how far out a result is.

MEASUREMENT, UNCERTAINTY AND SIGNIFICANT FIGURES IN CHEMISTRY

**DEFINITION**

Heating a reaction mixture with a vertical condenser fitted, so that vapours condense and return to the flask and no volatile substance is lost.

APPARATUS, TECHNIQUES AND SAFETY

**DEFINITION**

Finding the mass of solid transferred by weighing its container before and after the transfer and subtracting.

APPARATUS, TECHNIQUES AND SAFETY

**DEFINITION**

The liquid that passes through the filter paper during filtration.

APPARATUS, TECHNIQUES AND SAFETY

**DEFINITION**

Separating a liquid from a mixture by boiling it and condensing the vapour in a separate vessel.

APPARATUS, TECHNIQUES AND SAFETY

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DEFINITION

Define: Recrystallisation.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Hazard.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Risk.

APPARATUS, TECHNIQUES AND SAFETY

SPOT THE ERROR

Say what is wrong with this claim:

A measuring cylinder is as good as a pipette as long as I read the meniscus carefully.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Define: Polyatomic ion.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Water of crystallisation.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Diatomic molecule.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Balanced equation.

FORMULAE, EQUATIONS AND STATE SYMBOLS

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DEFINITION

A substance, object or activity with the potential to cause harm.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Purifying a solid by dissolving it in the minimum volume of hot solvent and letting the solution cool, so that the product crystallises and soluble impurities stay in solution.

APPARATUS, TECHNIQUES AND SAFETY

SPOT THE ERROR

Reading carefully cannot beat the glassware. A measuring cylinder is graduated to a few tenths of a cubic centimetre at best; a pipette delivers its one volume to a few hundredths. The uncertainty is set by how the vessel was made and calibrated, not by the care of the reader, which is why a titration uses a pipette and a burette.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

The likelihood that harm from a hazard will occur in the way an activity is carried out, together with how severe that harm would be.

APPARATUS, TECHNIQUES AND SAFETY

DEFINITION

Water molecules held in a fixed ratio within the crystal lattice of a hydrated salt.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

An ion made of two or more atoms covalently bonded together and carrying an overall charge, such as $SO_4^{2-}$ or $NH_4^+$.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

An equation with the same number of atoms of each element, and the same total charge, on each side.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

A molecule made of two atoms, as in the elements hydrogen, nitrogen, oxygen and the halogens.

FORMULAE, EQUATIONS AND STATE SYMBOLS

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DEFINITION

Define: Coefficient.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: State symbol.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Aqueous.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Precipitate.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Spectator ion.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Ionic equation.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Salt.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Define: Half-equation.

FORMULAE, EQUATIONS AND STATE SYMBOLS

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DEFINITION

A symbol after a formula giving its physical state: (s) solid, (l) liquid, (g) gas or (aq) dissolved in water.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

The number written in front of a formula in an equation, giving how many units of that substance react or form.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

An insoluble solid formed when two solutions are mixed and react.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

Dissolved in water, shown by the state symbol (aq) in an equation.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

An equation showing only the ions and other species that take part in a reaction, with spectator ions left out.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

An ion present in the reaction mixture that is unchanged by the reaction and appears identically on both sides of the equation.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

An equation for the oxidation or the reduction half of a redox reaction on its own, with electrons shown to balance the charge.

FORMULAE, EQUATIONS AND STATE SYMBOLS

DEFINITION

A compound formed when the hydrogen ions of an acid are replaced by metal ions or ammonium ions.

FORMULAE, EQUATIONS AND STATE SYMBOLS

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SPOT THE ERROR

Say what is wrong with this claim:

To balance an equation I can change the small numbers as well as the big ones, as long as the atoms come out equal.

FORMULAE, EQUATIONS AND STATE SYMBOLS

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SPOT THE ERROR

The small numbers are the formula, and the formula is fixed by the compound. Writing $H_2O_2$ to make the oxygen balance does not balance the equation for water; it writes an equation for hydrogen peroxide instead. The balance comes from the coefficients in front: $2H_2 + O_2 \rightarrow 2H_2O$.

FORMULAE, EQUATIONS AND STATE SYMBOLS

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