INKCHEMISTRY FLASHCARDS

Amount of substance

Unit C02 · 52 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: Mole.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Avogadro constant.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Amount of substance.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Relative molecular mass.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Relative formula mass.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Molar mass.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Water of crystallisation.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Hydrated.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

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DEFINITION

The number of particles in one mole of a substance, 6.022×10^{23} mol^{-1}, symbol L.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

The amount of substance that contains 6.022×10^{23} particles, the same number as there are atoms in 12 g of carbon-12.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

The weighted mean mass of a molecule compared with one twelfth of the mass of an atom of carbon-12.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

The quantity that counts the particles in a sample, measured in moles, symbol n.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

The mass of one mole of a substance, in g mol^{-1}, numerically equal to its relative formula mass.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

The weighted mean mass of a formula unit of a compound compared with one twelfth of the mass of an atom of carbon-12, used for ionic compounds.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Describes a crystalline compound that contains water of crystallisation.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

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

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

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DEFINITION

Define: Anhydrous.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Heating to constant mass.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

SPOT THE ERROR

Say what is wrong with this claim:

A mole is a fixed amount of mass, so a mole of hydrogen and a mole of lead ought to weigh the same.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Define: Ideal gas.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Absolute zero.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Kelvin temperature.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Avogadro's law.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Elastic collision.

GASES AND THE IDEAL GAS EQUATION

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DEFINITION

Repeating the cycle of heating, cooling and weighing until two successive masses agree, which shows the change is complete.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Describes a substance that contains no water of crystallisation.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

A gas whose molecules have negligible volume and no intermolecular forces, so that it obeys pV = nRT exactly.

GASES AND THE IDEAL GAS EQUATION

SPOT THE ERROR

A mole is a fixed number of particles, 6.022 × 10^{23}, not a fixed mass. One mole of hydrogen atoms has a mass of 1.0 g and one mole of lead atoms 207.2 g, because each lead atom is about 200 times heavier. The molar mass is the relative atomic or molecular mass in grams.

THE MOLE, THE AVOGADRO CONSTANT AND MOLAR MASS

DEFINITION

Temperature measured from absolute zero, in K, found by adding 273 to the temperature in °C.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

The lowest possible temperature, 0 K or -273 °C, at which particles have the minimum possible energy.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

A collision in which the total kinetic energy of the colliding particles is unchanged.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Equal volumes of all gases at the same temperature and pressure contain equal numbers of molecules.

GASES AND THE IDEAL GAS EQUATION

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DEFINITION

Define: Ideal gas equation.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Gas constant.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Molar gas volume.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Room temperature and pressure.

GASES AND THE IDEAL GAS EQUATION

SPOT THE ERROR

Say what is wrong with this claim:

A mole of a heavy gas such as carbon dioxide must take up more room than a mole of a light gas such as hydrogen.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

Define: Empirical formula.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Molecular formula.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Structural formula.

EMPIRICAL AND MOLECULAR FORMULAE

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DEFINITION

The constant R in the ideal gas equation, equal to 8.31 J K^{-1} mol^{-1}.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

pV = nRT, relating the pressure, volume, amount and kelvin temperature of an ideal gas.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

About 293 K and 101 kPa, the conditions at which the molar gas volume is taken as 24.0 dm^3 mol^{-1}.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

The volume occupied by one mole of any gas at a stated temperature and pressure, 24.0 dm^3 mol^{-1} at room temperature and pressure.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

The simplest whole-number ratio of atoms of each element in a compound.

EMPIRICAL AND MOLECULAR FORMULAE

SPOT THE ERROR

At the same temperature and pressure a mole of any gas occupies the same volume, 24.0 dm^3 at room temperature and pressure. The molecules are so far apart that their own size does not matter, and pV = nRT has no term for what the gas is. Carbon dioxide is 22 times as dense as hydrogen because each molecule is 22 times heavier.

GASES AND THE IDEAL GAS EQUATION

DEFINITION

The minimal detail that shows the arrangement of atoms in a molecule, group by group, such as CH_3CH_2OH.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

The actual number of atoms of each element in one molecule of a compound.

EMPIRICAL AND MOLECULAR FORMULAE

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DEFINITION

Define: Displayed formula.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Structural isomers.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Empirical formula mass.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Percentage by mass.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Hydrocarbon.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Combustion analysis.

EMPIRICAL AND MOLECULAR FORMULAE

SPOT THE ERROR

Say what is wrong with this claim:

The empirical formula is the real formula of the compound, so a molecule of ethanoic acid must be CH_2O.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Define: Concentration.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

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DEFINITION

Compounds with the same molecular formula but a different structural formula.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

A formula showing the relative positioning of all the atoms in a molecule and every bond between them.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

The mass of an element in a compound as a percentage of the mass of the compound, equal to its mass in grams in 100 g.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

The sum of the relative atomic masses of the atoms in the empirical formula.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

Finding the masses of carbon and hydrogen in a compound by burning a weighed sample in excess oxygen and weighing the carbon dioxide and water formed.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

A compound that contains carbon and hydrogen only.

EMPIRICAL AND MOLECULAR FORMULAE

DEFINITION

The amount of solute, in moles, dissolved in each 1 dm^3 of solution.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

SPOT THE ERROR

The empirical formula is only the simplest whole-number ratio of atoms. Ethanoic acid, CH_3COOH, is $C_2H_4O_2$: twice CH_2O. Methanal is CH_2O and glucose is $C_6H_{12}O_6$, and all three share the ratio. The molecular formula needs the relative molecular mass as well, from a mass spectrum, to say how many times the ratio is repeated.

EMPIRICAL AND MOLECULAR FORMULAE

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DEFINITION

Define: Mass concentration.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Standard solution.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Primary standard.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Titre.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: End point.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Equivalence point.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Concordant titres.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Back titration.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

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DEFINITION

A solution whose concentration is known accurately.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

The mass of solute dissolved in each 1 dm^3 of solution, in g dm^{-3}.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

The volume of solution added from the burette to reach the end point.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

A pure, stable, non-hygroscopic solid that can be weighed accurately to make a standard solution directly.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

The point at which the reactants have been added in exactly the amounts the equation requires.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

The point in a titration at which the indicator first changes colour permanently.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

A method in which an excess of a reagent of known amount is added, and the excess left over is then found by titration.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Titres that agree with each other to within 0.10 cm^3.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

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DEFINITION

Define: Parts per million.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

SPOT THE ERROR

Say what is wrong with this claim:

One careful titration is enough; the repeats are only there in case something went wrong.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Define: Limiting reagent.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: In excess.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: Theoretical yield.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: Percentage yield.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: Actual yield.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: Overall yield.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

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SPOT THE ERROR

The first titration is rough, run quickly to find roughly where the end point is. The accurate titres come after it, added drop by drop near the end point, and they are repeated until two or three agree within 0.10 cm^3. The mean of the concordant titres is used, and the rough titre is never included in it.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

The mass of solute in one million units of mass of solution, or for a gas the volume in one million units of volume of air.

CONCENTRATION, VOLUMETRIC SOLUTIONS AND TITRATION CALCULATIONS

DEFINITION

Present in more than the amount needed to react with the limiting reagent, so that some is left at the end.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

The reactant that is completely used up first, and so determines the maximum amount of product.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

The actual mass of product obtained as a percentage of the theoretical maximum mass.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

The mass of product that would form if all of the limiting reagent reacted as the equation shows.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

The yield of a synthesis of several steps, found by multiplying together the fractional yields of the steps.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

The mass of pure, dry product actually collected at the end of a preparation.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

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DEFINITION

Define: Atom economy.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: Addition reaction.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

Define: By-product.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

SPOT THE ERROR

Say what is wrong with this claim:

A reaction with a 100% yield wastes nothing, so yield and atom economy measure the same thing.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

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DEFINITION

A reaction in which two or more molecules join together to form a single product.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

The mass of the desired product as a percentage of the total mass of all the reactants, calculated from the balanced equation.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

SPOT THE ERROR

Yield compares the product obtained with the most the equation allows; atom economy compares the wanted product's mass with the mass of all the products. A reaction can give every molecule it promises and still send most of its mass out as by-product. Aspirin made from ethanoic anhydride has an atom economy of 75% whatever its yield.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

DEFINITION

A substance formed in a reaction alongside the desired product.

REACTING MASSES, PERCENTAGE YIELD AND ATOM ECONOMY

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