Chemistry Definitions

An energy level is the fixed energy value that an electron in an atom may have. — 2008, 2007

Heisenberg uncertainty principle: is is impossible to measure at the same time both the velocity and the position of an electron. — 2009, 2006

An orbital is a region in space within which there is a high probability of finding an electron. — 2011, 2010, 2006, 2005

An element is a substance that cannot be split up into simpler substances by chemical means.

An element is a substance all of whose atoms have the same atomic number

The periodic law: when elements are arranged in order of increasing atomic number the properties of the elements vary periodically.

The atomic number of an atom is the number of protons in the nucleus of that atom. — 2011

The mass number of an element is the sum of the number of protons and neutrons in the nucleus of an atom of that element. — 2011

Isotopes are of the same elements that have different mass numbers due to the different number of neutrons in the nucleus. — 2009, 2006, 2005

A radio isotope is a radioactive isotope or the radioactive form of the element.

Relative atomic mass is the average of the mass numbers of the isotopes of the element as they occur naturally, taking their abundancies into account and compared with $1/12^{th}$ of the mass of the carbon – 12 isotopes. — 2011, 2006, 2004

The aufbau principle: when building up the electronic configuration of an atom in its ground state, the electrons occupy the lowest available energy level.

Pauli exclusion principle: no more than two electrons can occupy an orbital and they must have an opposite spin.

Hund’s rule: when two or more orbitals of equal energy are available electrons occupy them singly before filling them in pairs.

A compound is a substance that is made up of two or more different elements combined together chemically.

The octet rule states that when bonding occurs, atoms tend to reach an electron arrangement with eight electrons in the outermost shell.

An ionic bond is the force of attraction between oppositely charged ions in a compound.

A transition element is one that forms at least one ion with a partially filled d sub-level.

A covalent bond is formed when two atoms share a pair of electrons. 2005

The valency of an element is the number of atoms of hydrogen or any other monovalent element with which each atom of that element combines.

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Electro negativity is the relative attraction that an atom in a molecule has for the shared pair of electrons in a covalent bond. 2008 2006 2005

Law of conservation of mass: The total mass of the products of a chemical reaction is the same as the total mass of the reactants.

Law of conservation of matter: In any chemical reaction, matter is neither created

nor destroyed, but merely changes from one form to another.

The atomic radius of an atom is defined as half the distance between the nuclei of two atoms of the same element that are joined together by a single covalent bond. 2007 2005

The first ionisation energy of an element is the energy required to remove the most loosely bound electron from a neutral gaseous atom. 2009 2004

Radioactivity is the spontaneous breaking up of unstable nuclei with the emission of one or more types of radiation. 2011 2010 2004

The half life of an element is the time taken for half of the nuclei in any given sample to decay. 2010

The relative molecular of a substance is the mass of one molecule of that substance compared with one twelfth of the mass of the carbon – 12 – isotope.

One mole of a substance is the amount of that substance which contains 6 x 10^{23} particles of that substance. 2011 2005

Number of moles = mass in grams / mass of one mole.

Boyle's law states that at constant temperature the volume of a fixed mass of gas is inversely proportional to its pressure.

Charles' Law states that at constant pressure the volume of a fixed mass of gas is directly proportional to its temperature measure on the kelvin scale. 2004

Gay lussacs law – states that in a reaction between gases, the volumes of the reacting gases and the volumes of any gaseous products are in the ratio of small whole numbers provided that the volumes are measured at the same temperature and pressure. 2010

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Avogadro’s law states that equal volumes of gases contain equal numbers of molecules under the same conditions of temperature and pressure.

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An ideal gas is one that obeys all of the assumptions of the kinetic theory of gases under all conditions of temperature and pressure.

The empirical formula of a compound is the formula which gives the simplest whole number ratio of the elements in the compound.

The molecular formula of a compound is the formula that gives the actual number of each atom in the molecule.

Arrhenius definition for an acid is: an acid is a substance that dissociates in water to produce H^+ ions

Arrhenius definition for a base is: a base is a substance that dissociates in water to produce OH^- ions.

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Bronsted Lowry definition: an acid is a proton donor.

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Bronsted Lowry definition: a base is a proton acceptor.

A conjugate acid – base pair is any pair consisting of an acid and a base which differ by one proton.

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Neutralisation is the reaction between an acid and a base to form a salt and water.

A salt is the substance formed when the hydrogen atom in an acid is replaced by a metal or ammonium ion.

The concentration of a solution is the amount of solute that is dissolve in a given volume of a solution.

Parts per million = number of milligrams per litre.

The molarity of a solution is the number of moles of solute per litre of solution.

Number of moles = volume x molarity / 1000

A standard solution is a solution of precisely known concentration.

A primary standard is a substance which can be obtained in a stable, pure and soluble solid form so that it can be weighed out and dissolved in water to give a solution of accurately known concentration. 2007

Oxidation of an element takes place when it loses electrons. 2008

Reduction of an element takes place when it gains electrons.

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Oxidation number is the charge that an atom has or appears to have when electrons are distributed according to certain rules. 2006

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Oxidation is the increase in oxidation number 2006

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Reduction is a decrease in oxidation number.

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The rate of reaction is the change in the concentration per unit time of any one reactant or product. 2007

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The instantaneous rate of reaction is the change in concentration per unit time of any one reactant or product at a given

moment of time.

A catalyst is a substance that alters the rate of a chemical reaction but is not consumed in the reaction.

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The activation energy is the minimum energy which colliding particles must have for a reaction to occur.

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Chemical equilibrium is a state of a dynamic balance where the rate of the forward reaction equals the rate of the backward reaction.

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Le Chateliers principle is where a system is in equilibrium is subjected to a stress i.e. a change in temperature, pressure, or concentration, then the system will alter so as to oppose the effect of the stress.

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If a stress is applied to a system at a equilibrium the system readjusts to relieve the stress applied

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pH may be defined as $pH = -\log_{10}[H^+]$

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pOH may be defined as $pOH = -\log_{10}[OH^-]$

The ionic product of water $(K_w) = [H^+][OH^-]$

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$pH + pOH = 14$

Hard water is water that will not easily form a lather with a soap

2006

Biochemical oxygen demand is the amount of dissolved oxygen consumed by biological action when a sample of water is kept at 20 degrees celcius in the dark for five days.

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Eutrophication is the enrichment of water with nutrients.

2007

Electrolysis is the use of electricity to bring about a chemical reaction.

Electroplating is a process where electrolysis is used to put a layer of one metal on the surface of another.

The electrochemical series is a list of elements in order of their standard electrode potentials.

Organic chemistry is defined as the study of the compounds of carbon.

Hydrocarbons are compounds containing carbon and hydrogen only. 2009

A homologous series is a group of compounds all members of which contain the same function group of atoms and successive members of a homologous series differ in size by CH_2 2011 2006

A functional group is a group of atoms on which the characteristic properties of a particular homologous series depend.

Heat of reaction is the heat change when the number of moles of a reaction indicated in the balanced equation for the reaction react completely.

The heat of combustion of a substance is the heat change when one mole of a substance is completely burned in excess oxygen. 2010

Bond energy is the energy required to break one mole of covalent bonds to separate the neutral atoms. 2009

The heat of formation of a compound is the heat change that takes place when one mole of a compound in its standard state is formed from its elements in their standard states. 2004

Hess’s law states that if a chemical reaction takes place in a number of stages the sum of the heat changes in the separate stages in equal to the heat change if the reaction is carried out in one stage.

A functional group is an atom or group of atoms which is responsible for the characteristics properties of a series of organic compounds.

A substitution reaction is a chemical reaction in which an atom or group of atoms in a molecule is replaced by another atom or group of atoms.

The mechanism of a reaction is the detailed step – by – step description of how the overall reaction occurs.

An addition reaction is one in which two substances react together to form a single substance.

Catalytic cracking is the breaking down of long chain hydrocarbon molecules into smaller molecules. 2007

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The octane number of a fuel is a measure of the tendency of the fuel to resist knocking. 2006

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The principle of mass spectrometry is where positive ions (charged particles) are separated (deflected, spread out) based on (according to) relative mass(es) (charge-to-mass ratio) when moving in a magnetic field 2009

Nitrogen fixation is the conversion of atmospheric nitrogen to compounds which can be used by plants. 2005

The trapping of the sun’s energy by the atmosphere is called the greenhouse effect. 2009