RESULTANT VECTOR

A single vector having the same effect as two or more vectors together.

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NORMAL FORCE

The force or the component of a force which a surface exerts on an object with which it is in contact, and which is perpendicular to the surface

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FRICTIONAL FORCE

The force that opposes the motion of an object and acts parallel to the surface

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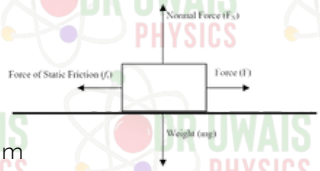
STATIC FRICTION FORCE

The force that opposes the tendency of motion of a stationary object relative to a surface.



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KINETIC FRICTION FORCE

The force that opposes the motion of a moving object relative to a surface

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NEWTON'S FIRST LAW OF MOTION

A body will remain in its state of rest or motion at a constant velocity unless a non-zero resultant/net force acts on it.

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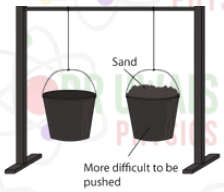
INERTIA

The resistance of an object to any change in its state of motion. The mass of an object is a quantitative measure of its inertia.



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NEWTONS SECOND LAW OF MOTION

When a net force acts on an object, the object will accelerate in the direction of the force and the acceleration is directly proportional to the force, and inversely proportional to the mass of the object.

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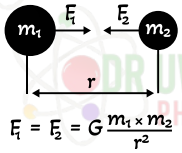
Fnet=ma

NEWTONS THIRD LAW OF MOTION

When object A exerts a force on object B, object B SIMULTANEOUSLY exerts an oppositely directed force of equal magnitude.



WEIGHTLESSNESS

The sensation experienced when all contact forces are removed, i.e. no external objects touch one's body.

NEWTONS LAW OF UNIVERSAL GRAVITATION

Each body in the universe attracts every other body with a force that is directionally proportionate to the product of their masses and inversely proportional to the square of the distance between the centers.

WEIGHT

The gravitational force the earth exerts on any object on or near its surface.

$$W=mg$$

MASS

Mass is the amount of matter in a body measured in kilogram (kg).

COULOMB'S LAW

The magnitude of the electrostatic force exerted by one point charge(Q1) on another point charge(Q2) is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance(r) between them.

$$F=\frac{kQ_1Q_2}{r^2}$$

ELECTRIC FIELD

A region of space in which an electric charge experiences a force. The direction of the electric field at a point is the direction that a positive test charge would move if placed at that point.

ELECTRIC FIELD AT A POINT

The electric field at a point is the electrostatic force experienced per unit positive charge placed at that point.

$$E=\frac{F}{Q}$$

OHMS LAW

The potential difference across a conductor is directly proportional to the current in the conductor at constant temperature.

$$R = \frac{V}{I}$$

OHMIC AND NON-OHMIC CONDUCTORS

Ohmic: obeys Ohm's law $V \propto I$

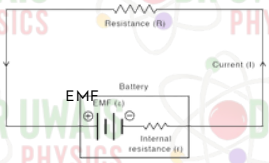
Example: Wires and resistors

Non-Ohmic: Does not obey Ohms law

Example: diodes, bulb filaments.

EMF

The maximum energy provided by a battery per unit charge, passing through it.



POWER

The rate at which work is done.

$$P = \frac{W}{\Delta t}$$

KILOWATT-HOUR

Kilowatt hour (kWh) refers to the use of 1 kilowatt of electricity for 1 hour. 1 kWh is an amount of electrical energy, also known as one unit of electricity.

FARADAY'S LAW OF ELECTROMAGNETIC INDUCTION

The magnitude of the induced EMF across the ends of a conductor is directly proportional to the rate of change in the magnetic flux linkage with the conductor

$$E = -N\frac{\Delta \Phi}{\Delta t}$$

CHEMICAL BOND

A mutual attraction between two atoms resulting from the simultaneous attraction between their nuclei and the outer electrons.

VALENCE ELECTRONS

Valence or outer electrons are the electrons in the highest energy level of an atom, in which there are electrons.

COVALENT BOND

The sharing of electrons between two atoms to form a molecule.

MOLECULE

A group of two or more atoms covalently bonded and that function as a unit.

DATIVE COVALENT BOND

Atoms with an empty valence shell can share a lone pair of electrons from another atom to form a coordinate covalent or dative covalent bond

BONDING PAIR

A pair of electrons that is shared between two atoms in a covalent bond.

LONE PAIR

A pair of electrons in the valence shell of an atom that is **not shared** with another atom.

ELECTRONEGATIVITY

A measure of the tendency of an atom in a molecule to attract bonding electrons.

NON-POLAR COVALENT BOND

A bond in which the electron density is shared equally between the two atoms. eg. H_2

POLAR COVALENT BOND

A bond in which the electron density is **shared unequally** between the two atoms. eg. HCL

BOND ENERGY

Bond energy of a compound is the energy needed to break one mole of its molecules into seperate atoms.

BOND LENGTH

The average distance between the nuclei of two bonded atoms.

ION-DIPOLE FORCES

Intermolecular forces between ions and polar molecules.

DIPOLE-DIPOLE FORCES

Intermolecular forces between two polar molecules.

DIPOLE-INDUCED DIPOLE FORCES

Intermolecular forces between polar and non-polar molecules.

LONDON FORCES

Intermolecular forces between non-polar molecules

HYDROGEN BONDING

Forces between molecules in which hydrogen is covalently bonded to nitrogen,oxygen or fluorine (N,O,F)

- A special case of dipole-dipole forces.

BOILING POINT

The temperature at which the vapour pressure of a substance equals atmospheric pressure.

MELTING POINT

The temperature at which the solid and liquid phases of a substance are at equilibrium.

VAPOUR PRESSURE

The pressure exerted by a vapour at equilibrium with its liquid in a closed system.

SOLUBILITY

The property of a solid, liquid,or gaseous chemical substance(solute) to dissolve in a solid, liquid, or gaseous solvent to form a homogeneous solution.

IDEAL GAS

- has identical particles of zero volume
- no intermolecular forces between particles
- all collisions of the molecules with themselves or the walls of the container, are perfectly elastic.

BOYLES LAW

The pressure of an enclosed gas is inversely proportional to the volume it occupies at constant temperature.

TEMPERATURE

Temperature is a measure of the average kinetic energy of the molecules of the gas.

PRESSURE

Pressure exerted by a gas is a result of the collisions of the molecules with the walls of the container

MOLE

The SI unit for amount of substance.
One mole is the amount of substance having the same number of particles as there are atoms, e.g. 12g carbon—12.

AVOGADROS NUMBER (N_A)

The number of particles (atoms, molecules, formula-units) present in one mole ($N_A = 6.02 \times 10^{23}$ particles per mole)

MOLAR MASS

The mass of one mole of a substance measured in $g.mol^{-1}$

AVOGADROS LAW

One mole of any gas occupies the same volume at the same temperature and pressure.

CONCENTRATION

The amount of solute per litre of solution.

EMPIRICAL FORMULA

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

HEAT OF REACTION/ENTHALPY

$\triangle H$

The energy absorbed or released (per mole) in a chemical reaction.

EXOTHERMIC REACTIONS

Reactions that release energy

$\triangle H < 0$

ENDOTHERMIC REACTIONS

Reactions that absorb energy

$\triangle H > 0$

ACTIVATION ENERGY

The minimum energy needed for a reaction to take place.

ACTIVATED COMPLEX

The unstable transition state from reactants to products.

CATALYST

A substance that increases the rate of a chemical reaction without itself undergoing a permanent change. It provides an alternative path of lower activation energy and decreases the net activation energy.

ARRHENIUS THEORY

An acid is a substance that orifices hydrogen ions (H^+) or Hydronium ions (H_3O^+) in an aqueous solution

A base is a substance that produces hydroxide ions (OH^-) in aqueous solution.

LOWRY-BROWNSTED THEORY

An acid is a proton (H^+) donor

A base is a proton (H^+) receptor

DIPROTIC ACID

Acid that can donate 2 protons/H_2O per molecule

STRONG ACIDS

Ionise completely in water to form a high concentration of H_3O^+ ions

Eg: Hydrochloric acid HCL, Sulphuric Acid H_2SO_4,and Nitric Acid HNO_3.

WEAK ACIDS

Ionise incompletely in water to form a low concentration of H_3O^+ ions.

Eg: Ethanoic Acid CH_3COOH

Oxalic Acid $C_2H_2O_4$

WEAK BASES

Dissociate incompletely in water to form a low concentration of OH- ions.

Eg: Ammonia NH_3
Calcium Carbonate CaCO
Potassium Carbonate K CO

STRONG BASES

Dissociate completely in water to form a high concentration of OH- ions.
Eg: Sodium Hydroxide NaOH
Potassium Hydroxide KOH

CONCENTRATED/DILUTE ACIDS

Concentrated acids: contain a large number of moles of acid in proportion to the volume of water
Dilute Acids: contain a small number of moles of acid in proportion to the volume of water.

CONCENTRATED/DILUTE BASES

Concentrated Bases: contain a large number of moles of base in proportion to the volume of water
Dilute Bases: contain a small number of moles of base in proportion to the volume of water.

AMPHOLYTE

A substance that can act as a either a base or an acid

EQUIVALENCE POINT

The point in a titration at which the acid/base has **completely reacted** with the base/acid.

ENDPOINT OF A TITRATION

The point in a titration where the indicator changes colour.

PH SCALE

A scale of numbers from 0 to 14 used to express the acidity or alkalinity of a solution.

REDOX REACTIONS

- redox (oxidation-reduction) reactions involve electron transfer and changes in oxidation numbers

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OXIDATION

- loss of electrons
- increase in oxidation number

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REDUCTION

- gain of electrons
- decrease in oxidation number

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OXIDISING AGENT

A substance that:
is **reduced** and **gains electrons**.

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REDUCING AGENT

A substance that:
is **oxidised** and **loses electrons**.

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