

Class-7

Materials used in Daily Life

Introduction to materials

Definition: Materials are substances used to make objects or products in daily life, derived from natural or synthetic sources. They include metals, non-metals, acids, bases, salts, and polymers.

Classification: Based on properties like conductivity, reactivity, and uses. Examples: Metals (iron for tools), non-metals (oxygen for breathing), compounds (water for drinking).

Deep Insight: Materials science studies how properties affect applications, like why plastics are used in bottles (lightweight and durable) or metals in wires (conductive).

Acids

Definition: Acids are substances that release hydrogen ions (H^+) in water, giving a sour taste and turning blue litmus red. Examples: Vinegar (acetic acid), lemon juice (citric acid), hydrochloric acid (stomach acid).

Properties: Corrosive, react with metals to produce hydrogen gas, neutralize bases to form salts and water. Strong acids (e.g., sulfuric acid) are dangerous; weak acids (e.g., citric acid) are safe for food.

Uses in Daily Life: Cleaning (e.g., toilet cleaners), digestion (stomach acid), food preservation (pickles).

Deep Insight: Acids have pH less than 7; they conduct electricity in solution. The pH scale (0-14) measures acidity; lower pH means stronger acid.

Bases

Definition: Bases are substances that release hydroxide ions (OH^-) in water, giving a bitter taste and slippery feel, turning red litmus blue. Examples: Baking soda (sodium bicarbonate), soap (sodium hydroxide), milk of magnesia.

Properties: React with acids to form salts and water (neutralization), feel soapy, can be corrosive. Strong bases (e.g., caustic soda) are used in drain cleaners; weak bases (e.g., ammonia) in household cleaners.

Uses in Daily Life: Cooking (baking soda in cakes), cleaning (detergents), antacids for indigestion.

Deep Insight: Bases have pH greater than 7; they conduct electricity. Alkalis are water-soluble bases. Neutralization reaction: $Acid + Base \rightarrow Salt + Water$.

Salts

Definition: Salts are ionic compounds formed from the neutralization of acids and bases. They consist of positive metal ions and negative non-metal ions. Examples: Table salt (sodium chloride), Epsom salt (magnesium sulfate).

Properties: Most are soluble in water, have high melting points, conduct electricity when molten or in solution. They can be acidic, basic, or neutral based on parent acid/base.

Uses in Daily Life: Food seasoning (NaCl), water softening (washing soda), fertilizers (potassium salts), preservatives.

Deep Insight: Salts are electrolytes; common salt is essential for life (electrolyte balance).

Precipitation occurs when insoluble salts form, e.g., in soap scum.

Indicators and pH Scale

Indicators: Substances that change color to show acidity or basicity. Examples: Litmus (red in acid, blue in base), phenolphthalein (colorless in acid, pink in base), turmeric (yellow in acid, red in base).

pH Scale: Measures acidity/basicity from 0 (strong acid) to 14 (strong base); 7 is neutral (pure water). Daily examples: Lemon (pH 2), milk (pH 6.5), soap (pH 9).

Deep Insight: pH affects health (e.g., blood pH ~7.4); indicators are used in labs and homes to test soil, water, or food.

Other Common Materials

Metals: Conduct heat/electricity, malleable, ductile. Examples: Iron (nails), copper (wires), aluminum (foils). Alloys (mixtures like steel) are stronger.

Non-Metals: Poor conductors, brittle. Examples: Carbon (graphite in pencils), sulfur (matches), oxygen (air).

Polymers/Plastics: Synthetic materials like polyethylene (bags), PVC (pipes). Advantages: Lightweight, waterproof; disadvantages: Non-biodegradable, polluting.

Natural Materials: Wood (furniture), cotton (clothes), glass (windows).

Deep Insight: Materials are chosen for properties: Metals for strength, plastics for flexibility.

Recycling reduces waste; e.g., paper from wood pulp.

Applications in Daily Life

Household: Acids in vinegar for cleaning, bases in baking soda for baking, salts in toothpaste.

Food and Health: Acids in fruits for digestion, bases in antacids, salts in electrolytes.

Environment: pH testing for soil (affects plant growth), water quality.

Deep Insight: Materials impact sustainability; biodegradable alternatives like jute replace plastics. Chemical reactions in daily life include rusting (iron + oxygen) and digestion.

Key Concepts and Safety

Neutralization: Acid + Base $\rightarrow$ Salt + Water + Heat; used in treating bee stings (base) with vinegar (acid).

Reactivity Series: Metals react differently with acids; e.g., zinc reacts faster than copper.

Safety: Handle acids/bases with care; use gloves, avoid mixing. pH imbalance causes issues like acid rain.

Deep Insight: Materials' properties explain phenomena like why metals corrode or plastics melt.

Key Formulas and Units

pH: $-\log[H^+]$ (scale 0-14)

Neutralization: Acid (moles) = Base (moles) for complete reaction.

Deep Insight: Molarity (M) measures concentration of acids/bases.

Important Diagrams and Concepts

pH scale: Color-coded bar.

Neutralization reaction: Equation with reactants/products.

Material properties: Table comparing metals and non-metals.

Deep Insight: Electron transfer in ionic bonds for salts.

Exam Tips

Memorize properties, examples, and pH values; relate to daily uses.

Practice neutralization calculations and indicator tests.

Draw diagrams and label pH scale.

Common mistakes: Confusing acids with bases; forgetting safety precautions.

Important Questions for Exams (Class 7 Level)

Very Short Answer Questions (1-2 words or simple phrases)

What is an acid?

Name one base used in daily life.

What is the pH of pure water?

Define neutralization.

What is a salt?

Short Answer Questions (1-2 sentences)

Explain the difference between acids and bases with one example each.

How does litmus paper help identify acids and bases?

Describe one use of salt in daily life.

What happens when an acid reacts with a metal?

Why are plastics commonly used in daily life?

Long Answer Questions (Detailed explanations, 4-6 sentences)

Describe the properties of acids, bases, and salts with examples. Explain how they are formed and their importance in daily life.

Explain the pH scale and indicators. How are they used to test substances in the home or lab?

Discuss neutralization reactions with examples. How does it relate to treating acid-base imbalances in the body?

Compare metals, non-metals, and polymers as materials. Give daily life applications and environmental impacts.

Explain the reactivity of materials like acids with metals. Discuss safety measures and real-life examples of chemical reactions in daily life.