

- Balance each of the following skeleton equations:
 - 2 HCl \rightarrow ___ H₂ + ___ Cl₂
 - 2 C₂H₂ + 5 O₂ \rightarrow 4 CO₂ + 2 H₂O
 - ___ H₂SO₄ + ___ Ca(OH)₂ \rightarrow ___ CaSO₄ + 2 H₂O
 - ___ SrCl₂ + 2 NaNO₃ \rightarrow ___ Sr(NO₃)₂ + 2 NaCl
 - 3 Cl₂ + 2 FeBr₃ \rightarrow 2 FeCl₃ + 3 Br₂
- Write the balanced equation for the following word equations:
 - iron + sodium chloride \rightarrow iron(II) chloride + sodium
Fe + 2 NaCl \rightarrow FeCl₂ + 2 Na
 - methane + oxygen \rightarrow carbon dioxide + water
CH₄ + 2 O₂ \rightarrow CO₂ + 2 H₂O
 - phosphorus tribromide + bromine \rightarrow phosphorus pentabromide
PBr₃ + Br₂ \rightarrow PBr₅
 - calcium nitrate + potassium carbonate \rightarrow potassium nitrate + calcium carbonate
Ca(NO₃)₂ + K₂CO₃ \rightarrow 2 KNO₃ + CaCO₃
- Acids are chemical compounds that produce a solution with a pH of less than 7 and bases are chemical compounds that produce a solution with a pH of more than 7.
- Neutral compounds have a pH of 7, and are neither acidic nor basic.
- Generally, the chemical formula for an acid starts with a(n) H (hydrogen) and the chemical formula for a base ends with a(n) OH (hydroxide).
- Acids generally taste sour and bases generally taste bitter.
- Name two acids and explain how they are involved or useful in your everyday life.
HCl, hydrochloric acid (stomach acid) helps breakdown the food we eat.
Ascorbic acid (vitamin C) in juice is an essential vitamin.
Acetic acid (vinegar) is used in cooking, seasoning and some cleaners.
- Name two bases and explain how they are involved or useful in your everyday life.
Soap is useful for cleaning (yourself and other objects).
Eggs and baking soda are in foods that we eat.
Antacids (Mg(OH)₂) help combat heartburn.
- Give the approximate pH value of the following substances:

a) Eggs <u>8</u>	c) Lemon <u>2</u>	e) Soap <u>10</u>
b) Oven cleaner <u>13</u>	d) Water <u>7</u>	f) Stomach acid <u>1</u>
- On the pH scale, one unit of change represents a 10 times change in the degree of acidity or basicity.
- A lemon that has a pH of 2 is 100 times more acidic than a tomato that has a pH of 4.
- pH indicators are chemicals that change colour depending on the pH of the solution they are placed in.
- Litmus paper can be used to determine if a solution is acidic or basic.
- When blue litmus paper is placed in an acidic solution the paper turns red.
- When red litmus paper is placed in a basic solution the paper turns blue.

16. How can you use red and blue litmus paper to tell if a solution is neutral?
If you place red and blue litmus paper in a solution, they both will NOT change colours.
Red litmus paper STAYS red and blue litmus paper STAYS blue when the solution is neutral.
17. What colour is methyl red at the following pH levels?
 a) pH 4 red b) pH 6 yellow c) pH 8 yellow
18. What colour is phenolphthalein at the following pH levels?
 a) pH 4 colourless b) pH 6 colourless c) pH 8 pink
19. Write the name of each of the following acids:
 a) HBr hydrobromic acid d) HNO₃ nitric acid
 b) H₂CO₃ carbonic acid e) CH₃COOH acetic acid
 c) H₂S hydrosulphuric acid f) HCN hydrocyanic acid
20. The common name for the acid found in vinegar is acetic acid.
21. The chemical name for battery acid is sulphuric acid.
22. Write the chemical formula of each of the following acids:
 a) Hydrochloric acid HCl c) Hydroiodic acid HI
 b) Sulphurous acid H₂SO₃ d) Perchloric acid HClO₄
23. The chemical name of the base used as an antacid is magnesium hydroxide.
24. The chemical name of the base used in oven and drain cleaning products is sodium hydroxide and its formula is NaOH.
25. In solution, acids produce H⁺ ions and bases produce OH⁻ ions.
26. Solutions with a high concentration of hydrogen ions (H⁺) have a low (high/low) pH, while solutions with a high concentration of hydroxide ions (OH⁻) have a high (high/low) pH.
27. When an acidic solution is mixed with a basic solution, they can neutralize each other. Explain why this happens, being sure to write the chemical formula that occurs when hydrogen ions react with hydroxide ions. **H⁺ ions and OH⁻ ions react with each other to form water: H⁺ + OH⁻ → H₂O**
The hydrogen ions from the acid react with the hydroxide ions from the base to form water, a neutral compound. (Hence the term neutralization.)
28. Acids and bases form ions when dissolved in water and are both electrically conductive.
29. A salt is made up of a positive ion from a(n) base and a negative ion from a(n) acid.
30. The chemical formula for common table salt is NaCl.
31. Describe the term *neutralization reaction* and provide an example.
Neutralization is the name for a type of chemical reaction that occurs when an acid and a base react to form a salt and water.
HCl + NaOH → NaCl + H₂O
32. Complete and balance the following neutralization reactions:
 a) ___ HBr + ___ KOH → KBr + H₂O
 b) ___ H₂SO₄ + ___ Mg(OH)₂ → MgSO₄ + 2 H₂O
 c) 2 HNO₃ + ___ Ca(OH)₂ → Ca(NO₃)₂ + 2 H₂O
 d) 2 CH₃COOH + ___ Ba(OH)₂ → Ba(CH₃COO)₂ + 2 H₂O

33. A metal oxide is a type of chemical compound that contains a metal chemically combined with oxygen.
34. When a metal oxide dissolves in water, the solution becomes basic.
35. Complete and balance the following reactions involving metal oxides and water:
- $\text{K}_2\text{O}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \underline{2 \text{ KOH}}$
 - $\text{MgO}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \underline{\text{Mg(OH)}_2}$
 - $\text{Li}_2\text{O}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \underline{2 \text{ LiOH}}$
36. A non-metal oxide is a type of chemical compound that contains a non-metal chemically combined with oxygen.
37. When a non-metal oxide dissolves in water, the solution becomes acidic.
38. Complete and balance the following reactions involving non-metal oxides and water:
- $\text{SO}_{2(g)} + \text{H}_2\text{O}_{(l)} \rightarrow \underline{\text{H}_2\text{SO}_3}$
 - $\text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)} \rightarrow \underline{\text{H}_2\text{CO}_3}$
 - $\text{SO}_{3(g)} + \text{H}_2\text{O}_{(l)} \rightarrow \underline{\text{H}_2\text{SO}_4}$
39. Describe how the burning of fuels contributes to the environmental problem of acid precipitation, otherwise known as acid rain. **Fuels such as coal and gasoline burn in the presence of oxygen. The products are non-metal oxides which are released into the atmosphere. These non-metal oxides dissolve in rainwater to produce acid precipitation. Acid precipitation can be extremely harmful to plants and freshwater ecosystems (lakes & rivers).**
40. When metals react with acids they tend to release hydrogen gas (H₂) as a product.
41. Organic compounds are compounds containing carbon.
42. The term organic compound refers to almost all carbon containing compounds, while the term inorganic compound refers to compounds that generally do not contain carbon.
43. Inorganic compounds that DO contain carbon are carbonates, carbides, and oxides.
44. Classify each of the following compounds as either organic or inorganic:
- CaSO_4 inorganic
 - CH_4 organic
 - $\text{CH}_3\text{CH}_2\text{OH}$ organic
 - CO_2 inorganic
 - $\text{K}_2\text{HC}_6\text{H}_5\text{O}_7$ organic
 - SiC inorganic
 - C_5H_{12} organic
 - CoCO_3 inorganic
45. A hydrocarbon is a special type of organic compound that contains only the elements carbon and hydrogen.
46. The simplest hydrocarbon is methane. It consists of one carbon atom bonded to 4 hydrogen atoms.
47. An alcohol is another special type of organic compound. It contains only the elements carbon, hydrogen, and oxygen.