

Name: KEY

Properties, Polarity, and IMF Station

- 1.) Which of these formulas contains the most polar bond?
3 (1) H-Br (3) H-F
(2) H-Cl (4) H-I
- 2.) The bonds between hydrogen and oxygen in a water molecule are classified as
1 (1) polar covalent (3) ionic
(2) nonpolar covalent (4) metallic
- 3.) Hexane (C_6H_{14}) and water do *not* form a solution. Which statement explains this phenomenon?
3 (1) Hexane is polar and water is nonpolar. (3) Hexane is nonpolar and water is polar.
(2) Hexane is ionic and water is polar. (4) Hexane is nonpolar and water is ionic.
- 4.) Which molecule is nonpolar?
4 (1) H_2O (3) CO
(2) NH_3 (4) CO_2
- 5.) As a result of the gold foil experiment, it was concluded that an atom
2 (1) contains protons, neutrons, and electrons (3) has positrons and orbitals
(2) contains a small, dense nucleus (4) is a hard, indivisible sphere
- 6.) Which atom in the ground state has an outermost electron with the most energy?
1 (1) Cs (3) Li
(2) K (4) Na
- 7.) Which pair represents two forms of an element in the same phase at STP but with different structures and different properties?
2 (1) $I_2(s)$ and $I_2(g)$ (3) $H_2(g)$ and $Hg(g)$
(2) $O_2(g)$ and $O_3(g)$ (4) $H_2O(s)$ and $H_2O(l)$
- 8.) Which sample of CO_2 has a definite shape and a definite volume?
4 (1) $CO_2(aq)$ (3) $CO_2(l)$
(2) $CO_2(g)$ (4) $CO_2(s)$
- 9.) What occurs in order to break the bond in a Cl_2 molecule?
1 (1) Energy is absorbed. (3) The molecule creates energy.
(2) Energy is released. (4) The molecule destroys energy.
- 10.) Which statement describes a chemical change?
4 (1) Alcohol evaporates. (3) Table salt ($NaCl$) is crushed into powder.
(2) Water vapor forms snowflakes. (4) Glucose ($C_6H_{12}O_6$) and oxygen produce CO_2 and H_2O .
- 11.) At standard pressure, CH_4 boils at 112 K and H_2O boils at 373 K. What accounts for the higher boiling point of H_2O at standard pressure?
3 (1) covalent bonding (3) hydrogen bonding
(2) ionic bonding (4) metallic bonding
- 12.) A mixture of sand and table salt can be separated by filtration because the substances in the mixture differ in
4 (1) boiling point (3) freezing point
(2) density at STP (4) solubility in water

13.) Which sample of matter is classified as a substance?

(1) air

(2) ammonia

(3) milk

(4) seawater

14.) A solution consists of 0.50 mole of CaCl_2 dissolved in 100. grams of H_2O at 25°C . Compared to the boiling point and freezing point of 100. grams of H_2O at standard pressure, the solution at standard pressure has

(1) a lower boiling point and a lower freezing point

(2) a lower boiling point and a higher freezing point

(3) a higher boiling point and a lower freezing point

(4) a higher boiling point and a higher freezing point

15.) Which element is a liquid at 305 K and 1.0 atmosphere?

(1) magnesium

(2) fluorine

(3) gallium

(4) iodine

16.) At STP, which physical property of aluminum always remains the same from sample to sample?

(1) mass

(2) density

(3) length

(4) volume

17.) Which sample of matter sublimates at room temperature and standard pressure?

(1) $\text{Br}_2(\ell)$

(2) $\text{Cl}_2(\text{g})$

(3) $\text{CO}_2(\text{s})$

(4) $\text{SO}_2(\text{aq})$

18.) At $50.^\circ\text{C}$ and standard pressure, intermolecular forces of attraction are strongest in a sample of

(1) ethanoic acid

(2) ethanol

(3) propanone

(4) water

19.) Which statement explains why neon is a Group 18 element?

(1) Neon is a gas at STP.

(2) Neon has a low melting point.

(3) Neon atoms have a stable valence electron configuration.

(4) Neon atoms have two electrons in the first shell.

20.) Which element has chemical properties that are most similar to the chemical properties of fluorine?

(1) boron

(2) chlorine

(3) neon

(4) oxygen

21.) A solid element that is malleable, a good conductor of electricity, and reacts with oxygen is classified as

(1) metal

(2) metalloid

(3) noble gas

(4) nonmetal

22.) The phase of a sample of a molecular substance at STP is *not* determined by its

(1) arrangement of molecules

(2) intermolecular forces

(3) number of molecules

(4) molecular structure

23.) Which substance in the table below has the strongest intermolecular forces?

Substance	Molar Mass (g/mol)	Boiling Point (kelvins)
HF	20.01	293
HCl	36.46	188
HBr	80.91	207
HI	127.91	237

(1) HF

(2) HCl

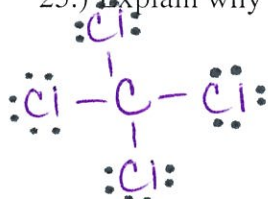
(3) HBr

(4) HI

24.) Explain, in terms of electronegativity difference, why the bond in H-Cl is more polar than the bond in H-I.

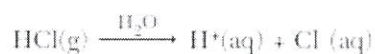
2.2 2.7 2.2 3.2
There is a greater difference in electronegativity between H & Cl than H & I.

25.) Explain why CCl₄ is classified as a nonpolar molecule.



CCl₄ has all electrons distributed symmetrically within the molecule.

A scientist makes a solution that contains 44.0 grams of hydrogen chloride gas, HCl(g), in 200. grams of water, H₂O(l), at 20.°C. This process is represented by the balanced equation below.



26.) Explain, in terms of the distribution of particles, why the solution is a homogeneous mixture.

This solution is a homogeneous mixture because particles are distributed symmetrically.