

SAT Chemistry Practice Paper 22

SET 1

1. Is the third most abundant gas in Earth's atmosphere

- A. Carbon
- B. Nitrogen
- C. Oxygen
- D. Neon
- E. Argon

2. At standard conditions, has an allotropic form that is a good electrical conductor

- A. Carbon
- B. Nitrogen
- C. Oxygen
- D. Neon
- E. Argon

3. Regardless of its electron configuration, it must always be paramagnetic when it's a single, neutrally charged atom

- A. Carbon
- B. Nitrogen
- C. Oxygen
- D. Neon
- E. Argon

4. The key element delivered in soil fertilizer

- A. Carbon
- B. Nitrogen
- C. Oxygen
- D. Neon
- E. Argon

5. Allotrope of this element is the primary absorber of UV solar radiation in Earth's atmosphere

- A. Carbon

B. Nitrogen

C. Oxygen

D. Neon

E. Argon

6. A conjugate acid/base pair with differing spectral absorbencies

A. Chemical pH indicator

B. Acid/base buffer

C. Anhydrous solution

D. Hypotonic solution

E. Supersaturated solution

7. An example of a solution not in equilibrium

A. Chemical pH indicator

B. Acid/base buffer

C. Anhydrous solution

D. Hypotonic solution

E. Supersaturated solution

8. Term used in reference to an aqueous solution's osmotic pressure

A. Chemical pH indicator

B. Acid/base buffer

C. Anhydrous solution

D. Hypotonic solution

E. Supersaturated solution

9. Addition of water to this solution will not change $[H_3O^+]$

A. Chemical pH indicator

B. Acid/base buffer

C. Anhydrous solution

D. Hypotonic solution

E. Supersaturated solution

10. Increased with the addition of a catalyst

- A. Standard voltaic potential
- B. Entropy
- C. Enthalpy
- D. Reaction rate
- E. Gibbs free energy

11. Abbreviated as H

- A. Standard voltaic potential
- B. Entropy
- C. Enthalpy
- D. Reaction rate
- E. Gibbs free energy

12. A property that must decrease when a gas condenses into a liquid

- A. Standard voltaic potential
- B. Entropy
- C. Enthalpy
- D. Reaction rate
- E. Gibbs free energy

13. Is always positive for a spontaneous chemical reaction

- A. Standard voltaic potential
- B. Entropy
- C. Enthalpy
- D. Reaction rate
- E. Gibbs free energy

14. Is zero for a crystalline solid that is elementally pure at 0 K

- A. Standard voltaic potential
- B. Entropy
- C. Enthalpy

D. Reaction rate

E. Gibbs free energy

15. The most unreactive family of elements

A. Alkali metals

B. Alkaline earth metals

C. Noble gases

D. Halogens

E. Transition metals

16. Form negative ions in an ionic bond

A. Alkali metals

B. Alkaline earth metals

C. Noble gases

D. Halogens

E. Transition metals

17. Consist of atoms that have valence electrons in a *d* subshell

A. Alkali metals

B. Alkaline earth metals

C. Noble gases

D. Halogens

E. Transition metals

18. Exist as diatomic molecules at room temperature

A. Alkali metals

B. Alkaline earth metals

C. Noble gases

D. Halogens

E. Transition metals

19. Members possess the lowest first ionization energy in their respective period

A. Alkali metals

B. Alkaline earth metals

C. Noble gases

D. Halogens

E. Transition metals

20. A product of a neutralization of a strong acid with a strong base

A. N_2

B. KI

C. CCl_4

D. $AgNO_3$

E. $CaCO_3$

21. A volatile covalent liquid at $25^\circ C$ and 1 atm

A. N_2

B. KI

C. CCl_4

D. $AgNO_3$

E. $CaCO_3$

22. Releases a gas with the addition of dilute acid

A. N_2

B. KI

C. CCl_4

D. $AgNO_3$

E. $CaCO_3$

23. Forms a white precipitate when added to a solution of NaCl

A. N_2

B. KI

C. CCl_4

D. $AgNO_3$

E. CaCO_3

SET 2

1. Treatment of the dry solid with a mild oxidizing agent produces a purple solid

A. N_2

B. KI

C. CCl_4

D. AgNO_3

E. CaCO_3

2. Is the principle reaction responsible for the energy output of the sun

A. Gamma decay

B. Nuclear fusion

C. Alpha decay

D. Positron emission

E. Nuclear fission

3. Is a nuclear process that results in no change in the mass number and atomic number of a nuclide

A. Gamma decay

B. Nuclear fusion

C. Alpha decay

D. Positron emission

E. Nuclear fission

4. Responsible for most helium found on Earth

A. Gamma decay

B. Nuclear fusion

C. Alpha decay

D. Positron emission

E. Nuclear fission

5. The nuclear process that transmutes uranium-238 into thorium-234

A. Gamma decay

- B. Nuclear fusion
- C. Alpha decay
- D. Positron emission
- E. Nuclear fission

6. Has a pH of 13

- A. 0.1 *M* MgCl₂
- B. 0.1 *M* HClO₄
- C. 0.1 *M* NH₄OH
- D. 0.1 *M* KOH
- E. 0.1 *M* LiNO₃

7. The solution with the lowest freezing point temperature

- A. 0.1 *M* MgCl₂
- B. 0.1 *M* HClO₄
- C. 0.1 *M* NH₄OH
- D. 0.1 *M* KOH
- E. 0.1 *M* LiNO₃

8. The solution with the highest boiling point temperature

- A. 0.1 *M* MgCl₂
- B. 0.1 *M* HClO₄
- C. 0.1 *M* NH₄OH
- D. 0.1 *M* KOH
- E. 0.1 *M* LiNO₃

9. Indicates a red flame when ionized with a Bunsen burner

- A. 0.1 *M* MgCl₂
- B. 0.1 *M* HClO₄
- C. 0.1 *M* NH₄OH
- D. 0.1 *M* KOH

E. 0.1 M LiNO₃

10. Choose the answer below that accurately describes the correct molecular shape for the molecule XeOF₄.

A. Tetrahedral

B. Trigonal pyramidal

C. Trigonal bipyramidal

D. Square pyramidal

E. Flat

11. For the radioactive atom ⁹⁹Tc, what is the correct number of protons and neutrons?

A. 43 protons and 56 neutrons

B. 43 protons and 99 neutrons

C. 56 protons and 43 neutrons

D. 56 protons and 99 neutrons

E. Cannot be determined

12. Which one of the following acids is NOT strong?

A. HCl

B. HBr

C. HNO₃

D. H₃PO₄

E. H₂SO₄

13. Identify the equation used to determine the amount of heat required to melt 10 grams of ice.

A. $Q = mC_{sp}\Delta T$

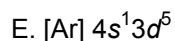
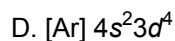
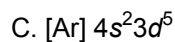
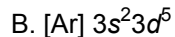
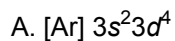
B. $Q = n\Delta H$

C. $KE = \frac{1}{2}mv^2$

D. $PE = mgh$

E. $PV = nRT$

14. Identify the correct ground state electron configuration for Cr.



15. What is the hydroxide concentration for a solution with a pH of 10 at 25°C?

A. $10^{-14} M$

B. $10^{-10} M$

C. $10^{-7} M$

D. $10^{-4} M$

E. $10^{-1} M$

16. Five hundred milliliters of solution of 0.1 M NaBr has how many milligrams of bromine?

A. 200 mg

B. 400 mg

C. 2,000 mg

D. 4,000 mg

E. 20,000 mg

17. According to the ideal gas law, what is the approximate volume that will be occupied by 0.5 mole of an ideal gas at 30°C and 3 atm pressure (gas constant $R = 0.0821 \text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K}$)?

A. Less than 1 L

B. 5 L

C. 10 L

D. 15 L

E. More than 20 L

18. Given that $\Delta G = \Delta H - T\Delta S$, how is the spontaneity of an endothermic reaction expected to change with decreasing T ?

A. Becomes less spontaneous

B. Becomes more spontaneous

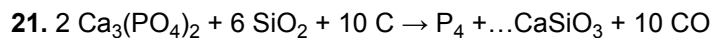
- C. Does not change
- D. Decreases at first but then increases
- E. Insufficient information to make a conclusion

19. Identify the element with the greatest first ionization energy.

- A. Ce
- B. C
- C. Cl
- D. Ca
- E. Cs

20. Identify the molecule/ion with the greatest potential to act as a Lewis acid.

- A. CH_3^+
- B. CN^-
- C. NH_3
- D. BF_4^-
- E. CO_2



Which coefficient balances the reaction given above?

- A. 2
- B. 4
- C. 5
- D. 6
- E. 8

22. A 100-milliliter solution containing AgNO_3 was treated with excess NaCl to completely precipitate the silver as AgCl . If 5.7 g AgCl was obtained, what was the concentration of Ag^+ in the original solution?

- A. 0.03 M
- B. 0.05 M
- C. 0.12 M
- D. 0.30 M

E. 0.40 *M*

23. Identify which of the following statements is FALSE.

- A. The vapor pressure of a liquid decreases with increasing atmospheric pressure.
- B. The value of an equilibrium constant is dependent on temperature.
- C. The rate of a spontaneous reaction cannot be determined solely by its Gibbs free energy.
- D. During a phase transition, the temperature of a substance must be constant.
- E. The addition of a catalyst to a reaction at equilibrium has no net effect on the system.