

EXAM, 2007/2015

Number of Items: 30

Time Allowed: 30 minutes

DIRECTIONS: This exam contains a total of 30 questions. Each of the question is followed by four possible alternatives. Read each question and carefully blacken only the letter of your choice on the separate answer sheet provided.

PHYSICAL CONSTANTS

1. Avogadro's Number, $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$
2. Faradays Constant, $F = 96500 \text{ C/mol}$
3. Gas Constant, $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1} = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$
5. Planck's constant, $h = 6.626 \times 10^{-34} \text{ Js}$
6. Speed of light, $c = 3.0 \times 10^8 \text{ ms}^{-1}$
7. Specific heat capacity of water = $4.18 \text{ J g}^{-1} \text{ K}^{-1}$
8. Rydberg constant, $R = 1.097 \times 10^7 \text{ m}^{-1}$
9. $a_0 = 0.053 \text{ nm}$

ATOMIC NUMBERS (Z) AND ATOMIC MASS (A)

- (B) Density (D) Melting point
3. The number of oscillation of a wave per unit of time
 (A) Frequency (C) Wave length
 (B) Amplitude (D) Wave number
4. Which one of the following is true about the colligative property of solution due to non volatile solute?
 (A) Boiling point depression
 (B) Lowering of vapour pressure
 (C) Change in enthalpy
 (D) Freezing point elevation
5. What are the number of protons, electrons and neutrons, respectively in $^{32}_{16}\text{S}^{2-}$?
 (A) 16, 18, and 16 (C) 18, 16 and 16
 (B) 14, 18, and 16 (D) 16, 16, and 16
6. Which spectral series of hydrogen is formed in the ultraviolet region?
 (A) Balmer series (C) Lyman series
 (B) Paschen series (D) Brackett series
7. Consider the decomposition of dinitrogen tetroxide, N_2O_4 to NO_2 at equilibrium:

$$\text{N}_2\text{O}_4(\text{g}) \leftrightarrow 2\text{NO}_2(\text{g}),$$
 which of the following statement is correct about the reaction?
 (A) Increase in temperature favours the reverse reaction
 (B) Decrease in pressure favours the forward reaction
 (C) Increase in pressure favours the forward reaction
 (D) Decrease in pressure favours the reverse reaction
8. In writing the electron configuration of an element, degenerate orbitals should be occupied first singly before the second electrons of opposite spin enters the orbital. This rule of thumb is called:
 (A) Aufbau principles (B) Pauli exclusion principles
 (B) Hund's rule (D) Building up principles
9. For the reaction $2\text{A}(\text{g}) + \text{B}(\text{g}) \leftrightarrow 3\text{C}(\text{g})$ at 200°C , the equilibrium constant is 3. If $[\text{A}] = 2.0\text{ M}$; $[\text{B}] = 3.0\text{ M}$; and $[\text{C}] = 2.0\text{ M}$, which of the following is correct?
 (A) $K_c = Q_c$ (C) $K_c < Q_c$
 (B) $K_c > Q_c$ (D) $Q_c = 0$
10. The hybrid orbital of the central atom and molecular geometry of the triiodide ion, I_3^- , respectively is:
 (A) sp^3d , linear (B) sp^3d , Trigonal bipyramidal

(C) sp^3 , Trigonal planar

(D) sp^3d^2 , linear

11. The amount of energy used to start a reaction is called:

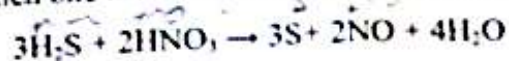
(A) Gibbs free energy

(C) Lattice energy

~~(B) Activation energy~~

(D) Ionization energy

12. Which one is NOT true for the following reaction?



~~(A) HNO_3 is reducing agent~~

(C) N is reduced

(B) S is oxidized ✓

(D) H_2S is reducing agent ✓

13. At certain temperature, the reaction: $CO(g) + Cl_2(g) \leftrightarrow COCl_2(g)$ has an equilibrium constant $K_c = 13.8$. If $[CO]_0 = 2.5 \text{ mol L}^{-1}$; $[Cl_2]_0 = 1.2 \text{ mol L}^{-1}$; and $[COCl_2]_0 = 5.0 \text{ mol L}^{-1}$, which of the following is correct?

(A) $Q_c = K_c$

~~(C) $Q_c < K_c$~~

(B) $Q_c > K_c$

(D) $Q_c = 2 K_c$

14. In which of the following molecule the central atom is surrounded by less than eight electrons?

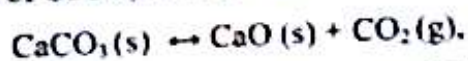
~~(A) BF_3~~

(C) NH_3

(B) CH_4

(D) SF_4

15. Consider decomposition of $CaCO_3$ at $1000^\circ C$:



If the pressure of CO_2 in equilibrium with $CaCO_3$ and CaO is 3.87 atm, what would be the value of K_c in terms of K_p ?

(A) $\frac{RT}{K_p}$

(C) $\frac{K_p}{(RT)^2}$

~~(B) $\frac{K_p}{RT}$~~

(D) $\frac{(RT)^2}{K_p}$

16. Many fruits and flowers have pleasant odour, due to the presence of

(A) Fatty acids

(C) Ethers

~~(B) Esters~~

(D) Carboxylic acids

17. The amount of heat energy required to raise the temperature of an object by $1^\circ C$ is called:

~~(A) Heat capacity~~

(C) Entropy

(B) Calorie

~~(D) Enthalpy~~

18. How much work, in KJ is done when a gas expands from 10 L to 25 L under a constant pressure of 2 atm?

- (A) ~~-30 kJ~~ (C) 30 kJ
(B) 3.04 kJ (D) -3.04 kJ

19. One of the following is **NOT** industrial application of electrolysis?

- (A) Extraction of Metals
(B) Electro refining of metals
(C) Electroplating
(D) Saponification

20. Which one of the following is example of secondary battery?

- (A) Alkaline Battery
(B) Car battery
(C) Mercury cells
(D) Silver oxide battery

21. The electrolyte used in silver oxide battery is:

- (A) KOH (C) HCl
(B) Ag₂O (D) HgO (correct)

22. Among the following one is a chemical method of concentrating ore:

- (A) Magnetic separation
(B) Gravity separation
(C) Froth floatation
(D) Leaching

23. Nitrogen fixing bacteria convert:

- ~~(A) Nitrogen gas to nitrate~~ ~~(C) Ammonia to nitrate~~
(B) Nitrate to nitrogen (D) Nitrate to ammonia

24. Which one of the following monosaccharide acts as energy source in human blood stream?

- (A) Glycogen (C) Cellulose
(B) Sucrose ~~(D) Glucose~~

25. One of the following is the process of converting vegetable oils in to fat.

- (A) Saponification
(B) Hydrolysis
(C) ~~Hydrogenation~~
(D) Hydration

26. Styrene-butadiene rubber (SBR) is made by polymerization of butadiene and styrene. One of the following is **incorrect** about SBR?

- (A) It has wide application in the manufacturing of drinking water plastic bags
(B) It has wide application in manufacturing of tires
(C) It is a synthetic polymer
(D) It is a copolymer

27. A given system absorbs 65 J of heat and 12 J of work is done on it by surrounding. What is the internal energy, ΔE of a system?
- (A) 77 J (C) 177 J
(B) 154 J (D) 245 J
28. In a certain chemical process both ΔH and ΔS have values greater than zero. Under what condition the process would be spontaneous?
- (A) $\Delta H > T\Delta S$ (C) $\Delta H < T\Delta S$
(B) $\Delta H = T\Delta S$ (D) $T = 0$
28. Which of the following statement best explains why atoms combine to form a compound?
- (A) When atoms react, they gain protons and more stable
(B) When atoms react, they lose all their electrons and become more stable
(C) When atoms react, they lose, gain, or share electrons and are less stable
(D) When atoms react, they lose, gain, or share electrons and are more stable
30. Conversion of 1-propanol into 1-propanal is an example of
- (A) Reduction (B) Oxidation (C) Hydrolysis (D) Dehydration
- Handwritten notes:*
a oxidize C
C 1-propanol 1-propanal

@NEAEA2012

**ONLINE TUTORIAL FOR ASTU
AND AASTU STUDENTS...**