

1101-1st Midterm Exam_11/03/21_(A)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which of the following is an illustration of the law of constant composition?

- A) Water is 11% hydrogen and 89% oxygen by mass.
- B) Water is a compound.
- C) Water can be separated into other substances by a chemical process.
- D) Water and salt have different boiling points.
- E) Water boils at 372 K at 101.325 kPa pressure.

Answer: A

2) Which of the following are chemical processes?

- 1. rusting of a nail
- 2. freezing of water
- 3. decomposition of water into hydrogen and oxygen gases
- 4. compression of oxygen gas

- A) 1, 2 B) 2, 3, 4 C) 1, 3 D) 1, 4 E) 1, 3, 4

Answer: C

3) Accuracy refers to _____.

- A) how close a measured number is to other measured numbers
- B) how close a measured number is to the calculated value
- C) how close a measured number is to zero
- D) how close a measured number is to infinity
- E) how close a measured number is to the true value

Answer: E

4) Which one of the following is an intensive property?

- A) temperature B) length C) amount D) volume E) mass

Answer: A

5) What would be the volume of a box that measures $1.12 \text{ m} \times 1.00 \text{ m} \times 0.69 \text{ m}$?

- A) 0.7728 B) 0.77 C) 0.773 D) 0.772800 E) 0.77280

Answer: B

6) Consider the following selected postulates of Dalton's atomic theory:

- (i) Each element is composed of extremely small particles called atoms.
- (ii) Atoms are indivisible.
- (iii) Atoms of a given element are identical.
- (iv) Atoms of different elements are different and have different properties.

Which of the postulates is(are) no longer considered valid?

- A) (iii) and (iv) B) (ii) only C) (iii) only D) (ii) and (iii) E) (i) and (ii)

Answer: D

7) The charge on an electron was determined in the _____.

- A) cathode ray tube, by J. J. Thomson
- B) Millikan oil drop experiment
- C) Dalton atomic theory
- D) Rutherford gold foil experiment
- E) atomic theory of matter

Answer: B

8) Which isotope has 36 electrons in an atom?

- A) $^{36}_{80}\text{Hg}$
- B) $^{78}_{34}\text{Se}$
- C) $^{80}_{36}\text{Kr}$
- D) $^{80}_{35}\text{Br}$
- E) $^{34}_{17}\text{Cl}$

Answer: C

9) The element X has three naturally occurring isotopes. The isotopic masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{159}X	30.60	159.37
^{163}X	15.79	162.79
^{164}X	53.61	163.92

- A) 161.75
- B) 163.15
- C) 162.35
- D) 162.03
- E) 33.33

Answer: C

10) Which formula/name pair is incorrect?

- A) $\text{Fe}_2(\text{SO}_3)_3$ iron(III) sulfite
- B) $\text{Fe}_2(\text{SO}_4)_3$ iron(III) sulfide
- C) FeSO_4 iron(II) sulfate
- D) FeS iron(II) sulfide
- E) FeSO_3 iron(II) sulfite

Answer: B

11) Which of the following compounds would you expect to be ionic?

- A) H_2O
- B) CO_2
- C) SrCl_2
- D) H_2S
- E) SO_2

Answer: C

12) Which of the following are combustion reactions?

- 1) $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- 2) $\text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s})$
- 3) $\text{PbCO}_3(\text{s}) \rightarrow \text{PbO}(\text{s}) + \text{CO}_2(\text{g})$
- 4) $\text{CH}_3\text{OH}(\text{l}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

- A) 1, 3, and 4
- B) 3 and 4
- C) 1 and 4
- D) 2, 3, and 4
- E) 1, 2, 3, and 4

Answer: C

13) Calculate the percentage by mass of oxygen in $\text{Pb}(\text{NO}_3)_2$.

- A) 19.3
- B) 9.7
- C) 33.4
- D) 14.5
- E) 29.0

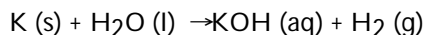
Answer: E

14) What is the total number of atoms in 0.139 mol of $\text{Fe}(\text{OH})_6^{3+}$?

- A) 19.0 B) 1.84×10^{24} C) 8.37×10^{22} D) 1.59×10^{24} E) 2.64

Answer: D

15) Balance the following reaction and determine the coefficient of potassium hydroxide.



- A) 1 B) 2 C) 3 D) 4 E) 5

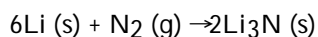
Answer: B

16) Combustion of a 0.9827-g sample of a compound containing only carbon, hydrogen, and oxygen produced 1.900 g of CO_2 and 1.070 g of H_2O . What is the empirical formula of the compound?

- A) $\text{C}_5\text{H}_7\text{O}_3$ B) $\text{C}_4\text{H}_{11}\text{O}_2$ C) $\text{C}_2\text{H}_5\text{O}$ D) $\text{C}_2\text{H}_5\text{O}_2$ E) $\text{C}_4\text{H}_{10}\text{O}$

Answer: B

17) Lithium and nitrogen react in a combination reaction to produce lithium nitride:



How many moles of lithium are needed to produce 0.45 mol of Li_3N when the reaction is carried out in the presence of excess nitrogen?

- A) 0.30 B) 0.23 C) 0.15 D) 1.35 E) 2.7

Answer: D

18) Lead (II) carbonate decomposes to give lead (II) oxide and carbon dioxide:



If the reaction yield is 92.4%, how many grams of lead (II) oxide will be produced by the decomposition of 1.30 g of lead (II) carbonate?

- A) 1.41 B) 1.18 C) 1.20 D) 1.00 E) 1.09

Answer: D

19) The net ionic equation for formation of an aqueous solution of $\text{Al}(\text{NO}_3)_3$ via mixing solid $\text{Al}(\text{OH})_3$ and aqueous nitric acid is _____.

- A) $\text{Al}(\text{OH})_3 \text{ (s)} + 3\text{HNO}_3 \text{ (aq)} \rightarrow 3\text{H}_2\text{O (l)} + \text{Al}^{3+} \text{ (aq)} + \text{NO}_3^- \text{ (aq)}$
B) $\text{Al}(\text{OH})_3 \text{ (s)} + 3\text{HNO}_3 \text{ (aq)} \rightarrow 3\text{H}_2\text{O (l)} + \text{Al}(\text{NO}_3)_3 \text{ (aq)}$
C) $\text{Al}(\text{OH})_3 \text{ (s)} + 3\text{NO}_3^- \text{ (aq)} \rightarrow 3\text{OH}^- \text{ (aq)} + \text{Al}(\text{NO}_3)_3 \text{ (s)}$
D) $\text{Al}(\text{OH})_3 \text{ (s)} + 3\text{NO}_3^- \text{ (aq)} \rightarrow 3\text{OH}^- \text{ (aq)} + \text{Al}(\text{NO}_3)_3 \text{ (aq)}$
E) $\text{Al}(\text{OH})_3 \text{ (s)} + 3\text{H}^+ \text{ (aq)} \rightarrow 3\text{H}_2\text{O (l)} + \text{Al}^{3+} \text{ (aq)}$

Answer: E

20) Which combination will produce a precipitate?

- A) $\text{Cu}(\text{NO}_3)_2$ (aq) and $\text{KC}_2\text{H}_3\text{O}_2$ (aq)
- B) KOH (aq) and HNO_3 (aq)
- C) $\text{AgC}_2\text{H}_3\text{O}_2$ (aq) and $\text{HC}_2\text{H}_3\text{O}_2$ (aq)
- D) NaOH (aq) and $\text{Sr}(\text{NO}_3)_2$ (aq)
- E) $\text{Pb}(\text{NO}_3)_2$ (aq) and HCl (aq)

Answer: E

21) In which reaction does the oxidation number of hydrogen change?

- A) HCl (aq) + NaOH (aq) \rightarrow NaCl (aq) + H_2O (l)
- B) SO_2 (g) + H_2O (l) \rightarrow H_2SO_3 (aq)
- C) 2Na (s) + $2\text{H}_2\text{O}$ (l) \rightarrow 2NaOH (aq) + H_2 (g)
- D) 2HClO_4 (aq) + CaCO_3 (s) \rightarrow $\text{Ca}(\text{ClO}_4)_2$ (aq) + H_2O (l) + CO_2 (g)
- E) CaO (s) + H_2O (l) \rightarrow $\text{Ca}(\text{OH})_2$ (s)

Answer: C

22) Which of the following are weak electrolytes?

HNO_3

HF

NH_3

LiBr

- A) HNO_3 , HF , NH_3 , LiBr
- B) HNO_3 , NH_3 , LiBr
- C) HF , NH_3
- D) HNO_3 , LiBr
- E) HF , LiBr

Answer: C

23) How many moles of K^+ are present in 343 mL of a 1.27 M solution of K_3PO_4 ?

- A) 3.70
- B) 0.145
- C) 1.31
- D) 0.436
- E) 11.1

Answer: C

24) The molarity (M) of an aqueous solution containing 85.1 g of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in 128 mL of solution is _____.

- A) 665
- B) 0.665
- C) 0.0019
- D) 0.249
- E) 1.94

Answer: E

25) A 31.5 mL aliquot of HNO_3 (aq) of unknown concentration was titrated with 0.0134 M NaOH (aq).

It took 23.9 mL of the base to reach the endpoint of the titration.

The concentration (M) of the acid was _____.

- A) 0.0204
- B) 0.0102
- C) 0.0051
- D) 1.02
- E) 0.227

Answer: B