Houston Community College System HCCS Time: 2 Hours
CHEM 1305 Exam I, Chapters 1-5
Summer Semester 2017

Student Name: _____ Student ID # _____
Instructor: Dr. Emad Akeer

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

2 Points each

1) What is the difference between a scientific theory and a natural law? 1) _____
A) A theory explains behavior and a law states a measurable relationship.
B) A law is a tentative proposal and a theory is a tested proposal.
C) A theory is a tentative proposal and a law is a tested proposal.
D) A law explains behavior and a theory states a measurable relationship.
E) none of the above

2) Which of the following is a branch of chemistry? 2) _____
A) environmental chemistry
B) analytical chemistry
C) physical chemistry
D) all of the above
E) none of the above

3) Which of the following metric rulers has the least uncertainty? 3) _____
A) Ruler C, ± 0.5 cm
B) Ruler A, ± 1 cm
C) Ruler D, ± 0.05 cm
D) Ruler B, ± 0.1 cm
E) All rulers have the same uncertainty.

4) How many significant digits are in the length measurement 10.01 cm? 4) _____
A) 1
B) 2
C) 3
D) 4
E) none of the above

5) How many significant digits are in the length measurement 61,000 cm? 5) _____
A) 2
B) 3
C) 4
D) 5
E) none of the above

6) Round off the following measurement to three significant digits: 19.945 g. 6) _____
A) 19.9 g B) 19.0 g C) 20.0 g D) 19.945 g E) 19.950 g

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7) What is the name corresponding to the metric symbol km? 7) _____
A) kilometer
B) kilomicro
C) kilomega
D) kilomilli
E) none of the above

8) Which of the following describes a substance in the solid physical state? 8) _____
A) The substance has a fixed shape.
B) The substance compresses negligibly.
C) The substance has a fixed volume.
D) all of the above
E) none of the above

9) What is the term for a change of state from a solid to a liquid? 9) _____
A) condensing
B) freezing
C) vaporizing
D) melting
E) none of the above

10) Which of the following can be separated into two or more pure substances using a physical method? 10) _____
A) element
B) compound
C) mixture
D) all of the above
E) none of the above

11) Air contains nitrogen, oxygen, argon, and other gases. Which of the following describes air? 11) _____
A) compound
B) element
C) homogeneous mixture
D) heterogeneous mixture
E) none of the above

12) Which of the following chemical elements corresponds to the symbol F? 12) _____
A) fluorine
B) phosphorus
C) fermium
D) francium
E) none of the above

13) Which of the following chemical symbols corresponds to chlorine? 13) _____
A) Cr
B) Co
C) Cl
D) Ce
E) none of the above

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14) Which of the following is a general characteristic of a nonmetal? 14) _____
A) brittle
B) solid or gaseous state
C) low density
D) nonconductor of heat
E) all of the above

15) Ammonium sulfate, $(NH_4)_2SO_4$, is in fertilizer and replenishes nitrogen to the soil. What is the number of atoms in the chemical formula of ammonium sulfate? 15) _____
A) 14
B) 15
C) 20
D) 13
E) none of the above

16) Which of the following is an example of a physical change? 16) _____
A) releasing gas bubbles
B) releasing light
C) changing from colorless to pink
D) changing from a solid to a liquid
E) none of the above

17) Which physical state demonstrates unrestricted movement of particles? 17) _____
A) liquid state
B) solid state
C) gaseous state
D) all of the above
E) none of the above

18) Which of the following subatomic particles are found inside the nucleus? 18) _____
A) proton and electron
B) electron and neutron
C) neutron and proton
D) all of the above
E) none of the above

19) Using atomic notation, indicate the isotope having 11 p^+, 12 n^0, and 11 e^-. 19) _____
A) $^{23}_{12}Mg$ B) $^{12}_{11}Mg$ C) $^{23}_{12}Na$ D) $^{12}_{11}Na$ E) $^{23}_{11}Na$

20) Boron occurs naturally as ^{10}B and ^{11}B. Which isotope is more abundant? 20) _____
(Hint: Refer to the Periodic Table.)
A) boron–10
B) boron–11
C) boron–5
D) boron–6
E) none of the above

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21) Which of the following types of radiation has the highest frequency? 21) _____
A) X rays
B) visible
C) infrared
D) ultraviolet
E) All radiation has the same frequency.

22) Which of the following is an example of a quantized change in energy? 22) _____
A) a ball rolling up a ramp
B) a ball rolling across a playground
C) a ball rolling down a ramp
D) a ball rolling down a flight of stairs
E) none of the above

23) Which of the following produces the "atomic fingerprint" of an element? 23) _____
A) excited protons jumping to a higher energy level
B) excited electrons dropping to a lower energy level
C) excited protons dropping to a lower energy level
D) excited electrons jumping to a higher energy level
E) none of the above

24) Which of the following is an alkali metal? 24) _____
A) Na
B) K
C) Li
D) all of the above
E) none of the above

25) Which of the following is a noble gas? 25) _____
A) Ar
B) He
C) Xe
D) all of the above
E) none of the above

26) What is the predicted ionic charge of an element in Group IA/1? 26) _____
A) 7–
B) 7+
C) 1–
D) 1+
E) none of the above

27) Which of the following elements has the least metallic character? 27) _____
A) S B) Br C) O D) F E) Cl

28) Which of the following has chemical properties most similar to sodium? 28) _____
A) He B) Fe C) B D) K E) Mg

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29) Which of the following is the electron dot formula for an atom of neon? 29) _____

(a) Ne· (b) ·Ne· (c) ·Ne· (d) :Ne: (e) :Ne:

A) (a) B) (b) C) (c) D) (d) E) (e)

30) Which of the following is a liquid metal at normal conditions? 30) _____

A) Zn
B) Ge
C) Hg
D) all of the above
E) none of the above

4 Points each

31) Multiply 2.505 cm times 1.75 cm and round off the answer. 31) _____

A) 4.38 cm^2 B) 4.00 cm^2 C) 4.384 cm^2 D) 4.0 cm^2 E) 4.40 cm^2

32) Add 5.0×10^4 to 2.0×10^3 and express the answer in scientific notation. 32) _____

A) 2.5×10^4 B) 5.2×10^3 C) 5.2×10^4 D) 2.5×10^3 E) 1.0×10^3

33) If the Moon is 246,000 miles from Earth, what is the distance in kilometers? 33) _____
(Given: 1 mi = 1.61 km)

A) 3,960,000 km
B) 153,000 km
C) 0.000 006 54 km
D) 15,300 km
E) 396,000 km

34) If 5.58 g of iron reacts with sulfur to produce 8.79 g of iron sulfide, what is the mass of reacting sulfur? 34) _____

A) 14.37 g
B) 3.21 g
C) 8.79 g
D) 5.58 g
E) impossible to predict from the given information

35) Given that the only naturally occurring isotope of gold is ^{197}Au, what is its isotopic mass? (Hint: Refer to the Periodic Table.) 35) _____

A) 117.97 amu
B) 275.97 amu
C) 118.00 amu
D) 196.97 amu
E) 79.00 amu

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36) What is the electron configuration for an atom of nickel? 36) _____

A) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^8$
B) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 4p^8$
C) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 4d^8$
D) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8$
E) none of the above

37) How many neutrons are in the nucleus of an atom of ^{200}Hg? 37) _____

A) 80
B) 200
C) 280
D) 120
E) none of the above

38) What is the chemical formula for the binary compound composed of Li^+ and O^{2-} ions? 38) _____

A) LiO
B) LiO_2
C) Li_2O_2
D) Li_2O
E) none of the above

39) What is the ionic charge for the cobalt ion in Co_3N_2? 39) _____

A) 3+
B) 2+
C) zero
D) 1+
E) none of the above

40) What is the predicted product from the following combination reaction? 40) _____

$$Zn(s) + I_2(s) \xrightarrow{\Delta}$$

A) ZnI_2 B) Zn_3I_2 C) ZnI D) Zn_2I_3 E) Zn_2I

Answer Key
Testname: CHEM 1305 TEST II

1) A
2) D
3) C
4) D
5) A
6) A
7) A
8) D
9) D
10) C
11) C
12) A
13) C
14) E
15) B
16) D
17) C
18) C
19) E
20) B
21) A
22) D
23) B
24) D
25) D
26) D
27) D
28) D
29) E
30) C
31) A
32) C
33) E
34) B
35) D
36) A
37) D
38) D
39) B
40) A