1.) How many sulfur atoms are in 3.00 g of iron pyrite, FeS2 (M = 120.0 g/mol)?

(A) 7.53 × 1021
(C) 3.01×1022
(B) 1.51 × 1022
(D) 6.02 × 1023

2.) What species is represented by the following information?
pt = 12
n° = 14
e= 10

A) Ne B)Si C)Mg D)Sit E) Mg2+

3.) ____ And _____ reside in the atomic nucleus.

A. Protons and electrons
B. Electrons and neutrons
C. Protons and neutrons
D. None of the above
E. Neutrons, only

4.) An organic compound contains only carbon, hydrogen, nitrogen, and oxygen. It is 61.71% C, 4.03% H, and 16.00% N by mass. What is its empirical formula?

(A) C5H4NO
(B) C9H7N2O2
(C) C10H8N2O
(D) C11H8NO2

5.) Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties?

(A) O,S
(B) C,N
(C)K, Ca
(D)H,He
(E)Si, P

6.) A sample of He gas (3.0 L) at 5.6 atm and 25 °C was combined with 4.5 L of Ne gas at 3.6 atm and 25 °C at constant temperature in a 9.0 L flask. The total pressure in the flask was
atm. Assume the
initial pressure in the flask was 0.00 atm.
A) 2.6
B) 9.2
C) 1.0
D) 24
E) 3.7

7.) The molar volume of a gas at STP is _ L.
A) 2.36

B) 1.00
C) 0.08206
D) 22.4
E) 14.7

8.) The density of air at STP is 1.285 g/L. Which of the following cannot be used to fill a balloon that will float in air at STP?
A) CH4
B) NO
C) NH3
D) HF
E) Ne

9.) Which one of the following conditions would always result in an increase in the internal energy of a system?

A. The system loses heat and has work done on it by the surroundings.
B. The system loses heat and does work on the surroundings.
C. The system gains heat and has work done on it by the surroundings.
D. The system gains heat and does work on the surroundings.
E. None of the above is correct.

10.) Which principle restricts the occupancy of an atomic orbital to no more than two electrons?

A. The principle of conservation of energy
B. The principle of conservation of angular momentum
C. The Pauli exclusion principle
D. The Heisenberg uncertainty principle

11.) Photons of what wavelength of light have an energy of 1.00 × 103 kJ mol 1?

(A) 2.00 × 1031 m
(C) 1.20 × 104 m
(B) 1.20 × 10 m
(D) 8.36 × 106 m

12.) The speed of light is 3.0x108m/s. What is this speed in nm/ms?

A. 3.0x10-4nm/ms B. 3.0x102nm/ms C. 3.0x1014nm/ms D. 3.0x1020nm/ms

13.) What is the name of Ti3(PO4)4 ?

A. Titanium phosphate B. Titanium (III) phosphate C. Titanium (IV) phosphate D. Titanium tetraphosphate

14.) Which is NOT named correctly?

A. MnO2 manganese (II) oxide B. CuSO4 copper (II) sulfate C. Na3PO4 sodium phosphate D. CaF2 calcium fluoride

15.) What is the correct name for N2O5 ?

A. Nitrogen (II) oxide B. Nitrogen (V) oxide C. Dinitrogen oxide D. Dinitrogen pentoxide

16.) Which pair of particles has the same number of electrons?

A. F-, Mg2+ B. Ne, Ar C. Br-, Se D. Al3+, P3-ur trioxide?

17.) What is the name of HBrO4 (aq)?

A. Bromic acid B. Bromous acid C. Hydrobromic acid D. Perbromic acid

18.) If a palladium nanoparticle has a density of 12.0 g/cm3, what is the mass of a nanoparticle with a volume of 1.84x10-21cm3?

A. 2.21x10-20g B. 1.63x10-20g C. 6.52x10-21 g D. 1.53x10-22g

19.) Which sample has the largest volume? The density of aluminum is 2.7 g/cm3and for copper is 9.0 g/cm3.

A. 1.0 g aluminum B. 5.0 g aluminum C. 1.0 g copper D. 5.0 g copper

20.) In all neutral atoms, there are equal numbers of

A. Protons and neutrons B. Positrons and electrons C. Neutrons and electrons D. Electrons and protons

21.) Which pair of particles has the same number of electrons?

A. F-, Mg2+ B. Ne, Ar C. Br-, Se D. Al3+, P3-

22.) Which element is represented by X24 56 ?

A. Iron B. Germanium C. Barium D. Chromium

23.) A sodium ion differs from a sodium atom in that the sodium ion

A. Has fewer electrons. B. Is an isotope of sodium. C. Exists only in solution. D. Has a negative charge on its nucleus

24. If gallium, atomic number 31, combines with selenium, atomic 34, what is the most likely formula based on your knowledge of the periodic nature of the elements?

A. GaSe B. GaSe 2 C. Ga2 Se D. Ga2Se

25.) What is the energy of a photon with a wavelength of 656 nm?

A. 3.03x10-19J B. 3.03x10-28J C. 4.35x10-31J D. 4.35x10-40J

26. Which emission line in the hydrogen spectrum occurs at the highest frequency?

A. n=3 to n=1 B. n=4 to n=2 C. n=7 to n=5 D. n=10 to n=8

27. Which set of quantum numbers is correct and consistent with n=4?

A. l=3, ml=-3, ms = + ½

B. l=4, ml=+2, ms = - ½

C. l=2, ml=+3, ms = + ½

D. l=3, ml=-3, ms = + 1

28.) The size of metal atoms

A. Generally increases progressively from top to bottom in a group in the periodic table.

B. Generally increases progressively from left to right in a period.

C. Are smaller than those of the corresponding ions.

D. Do not change upon losing electrons.

29.) Which of these elements has the smallest atomic radius?

A. Fluorine B. Chlorine C. Bromine D. Iodine

30.) What happens when a bromine atom becomes a bromide ion?

A. A positive ion is formed.

B. The bromine nucleus acquires a negative charge.

C. The atomic number of bromine is decreased by one.

D. The bromide ion is then larger than the bromine atom

31.) A 10 gram sample of which substance contains the greatest number of hydrogen atoms?

A. 10 grams of CH 4 B. 10 grams of HCl C. 10 grams of H 2 D. 10 grams of PH

32.) A 3.41x10-6 g sample is known to contain 4.67 x1016 molecules. What is this compound?

A. CH 4 B. CO 2 C. H2 O D. NH

33.) What is the mass of 1.75 moles of Zn?

A. 0.0268 g B. 37.4 g C. 65.4 g D. 114 g

34.) A sample of ethanol (C2H6 O) contains 3.024 g of hydrogen. How many moles of carbon are in the sample? (Molar mass of C2H6 O=46.07 g/mol)

A. 8.333x10-2 B. 0.1667 C. 0.2500 D. 0.9980

35.) What is the mass percent of oxygen in $Fe_2(SO_4)_3$?

A. 15.40% B. 18.76% C. 30.80% D. 48.01%

36.) How many moles of Ba_3N_2 are necessary to react completely with 1.5 mol of water?

$Ba_3N_2 + 6\ H_2O \rightarrow 3\ Ba(OH)_2 + 2\ NH_3$

A. 0.25 mol B. 1 mol C. 6 mol D. 9 mol

37.) How many water molecules are produced if 0.35 mol of propane, C_3H_8 , combusts in excess oxygen?

$C_3H_8(g) + 5\ O_2(g) \rightarrow 3\ CO_2(g) + 4\ H_2O\ (g)$

A. 5.1x1022 B. 2.1x1023 C. 8.2x1023 D. 2.4x1024

38.) Equimolar amounts of nitrogen, hydrogen, and argon are placed in a reaction chamber. The amount of which substance(s) will determine the amount of ammonia produced in the reaction below if the reaction goes to completion?

$N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3\ (g)$

A. Amonium B. Hydrogen C. Nitrogen

39.) What amount of the excess reagent remains when 0.500 mol Li reacts with 0.350 mol N_2 ?

$6\ Li\ (s) + N_2(g) \rightarrow 2\ Li_3N\ (s)$

A. 0.0833 mol N 2 B. 0.267 mol N 2 C. 0.150 mol Li D. 0.417 mol Li

40.) What is the strongest electrolyte in dilute aqueous solution?

A. $HClO_4$ B. HCN C. HF D. HNO_2

41.) What solution volume is needed to prepare a 0.110 M solution of $MgSO_4$ using 10.3 g of the compound? The molar mass of $MgSO_4$ is 120.366 g/mol.

A. 9.41x10-3L B. 0.778 L C. 1.11 L D. 93.6 L

42.) Which combination will result in a precipitate forming?

A. NaOH (aq) and HCl (aq)

B. NaOH (aq) and $FeCl_3$ (aq)

C. $NaNO_3$(aq) and $FeCl_3$ (aq)

D. Zn (s) and HCl (aq)

43.) What is a weak acid in water?

A. HBr B. HCl C. HF D. HI

44.) What is the oxidation number of chlorine in $NaClO_2$?

A. -1 B. +1 C. +3 D. +5

45.) What is the oxidizing agent in this reaction?

$Pt^{2+}(aq) + CH_3CH_2OH\ (aq) \rightarrow CH_3CHO\ (aq) + Pt\ (s) + 2\ H^+(aq)$

A. Pt^{2+} (aq) B. Pt (s) C. H^+(aq) D. CH_3CH_2OH (aq)

46.) If a system's internal energy increases by 250 kJ after the addition of 375 kJ of energy as heat, what was the value of the work in the process?

A. -625 kJ B. -125 kJ C. 125 kJ D. 625 kJ

47.) When a cold block of aluminum at 0°C is placed in room temperature water at 21°C in an insulated cup, the water and the aluminum end up at a final temperature of 19°C. Assuming there was no heat loss to the surroundings, which statement best describes the energy exchanged in this process?

A. The block of aluminum lost the energy that the water gained.

B. The block of aluminum gained the energy that the water lost.

C. The block of aluminum gained less energy compared to the energy lost by the water.

D. The block of aluminum gained more energy compared to the energy lost by the water.

48.) When 45.0 g sample of an alloy at 100.0°C is dropped into 100.0 g of water at 25.0°C, the final temperature is 37.0°C. What is the specific heat of the alloy? The specific heat of H2 O (l) is 4.184.

A.0.423 $J \cdot g{-}1 \cdot °C\ {-}1$

B.1.77 $J \cdot g{-}1 \cdot °C\ {-}1$

C. 9.88 $J \cdot g{-}1 \cdot °C\ {-}1$

D.48.8 $J \cdot g{-}1 \cdot °C\ {-}1$

49.) The best Lewis structure of N2H2 shows

A. A nitrogen-nitrogen triple bond.

B. A nitrogen-nitrogen simple bond.

C. Each nitrogen with one nonbonding electron pair.

D. Each nitrogen with two nonbonding electron pairs.

50.) Which molecule is polar?

A. CCl 4 B. CS 2 C. PH 3 D. PF 5

51.) What is the percent yield when 1.72 g of H2O2decomposes and produces 375 mL of O2 gas measured at 42°C and 1.52 atm? Molar mass of H2O2 is 34.02 g/mol.

$2\ H2O2(aq) \rightarrow 2\ H2O\ (l) + O2\ (g)$

A. 15.3% B. 30.7% C. 43.7% D. 87.2%