

Provided during the exam: periodic table (no names), ion chart, activity series, solubility chart, molarity formula, conversion from mL to L, pH formula

mole

Avogadro's number

molar mass

conversion from moles to grams

conversion from moles to molecules

conversion from grams to particles

molarity

hydrate

molecular formula

empirical formula

percent composition

seven diatomic gases

1) What are the empirical formulas of

 $C_6H_8O_6$ _____ CH_4 _____ $C_{40}H_{56}$ _____
2) How many oxygens are represented here: $6 Ba_3(PO_4)_2$? _____

3) What is the molar mass of ammonium silicate? [112.174 g or 112.17 g]

4) What is the molar mass of Vitamin A ($C_{20}H_{30}O$)? [286.44 g]

5) What is a mole? _____

6) What is Avogadro's number? _____

7) (a) Which gases are diatomic? _____

(b) What does that mean? _____

8) What is a hydrate? _____

9) What happens to a hydrate when you heat it? _____

10) List the prefixes used to name hydrates:

1 = _____ 2 = _____ 3 = _____

4 = _____ 5 = _____ 6 = _____

7 = _____ 8 = _____ 9 = _____

10 = _____

- 11) Calculate the mass in grams of 2.23 moles of nitrogen gas. [62.5 g]
- 12) Determine the number of molecules in 0.34 moles of nitrogen gas. [2.0×10^{23} molecules]
- 13) How many atoms of sulfur are in 1.60×10^{-14} g of sulfur? [3.00×10^8 atoms]
- 14) What is molarity? _____
- 15) Calculate the molarity of a 2.00 L solution that contains 5.56 mol of NaCl. [2.78 M or mol/L]
- 16) Calculate the molarity of a 200.0 mL solution that contains 19.2 g of KOH. [1.71 M or mol/L]
- 17) What is the percent composition of each element in $\text{Ca}_3(\text{PO}_4)_2$? [38.8% Ca, 20.0 % P, 41.3 % O]

18) What is the empirical formula of a compound that is 53.73 % Fe and 46.27 % S? $[\text{Fe}_2\text{S}_3]$

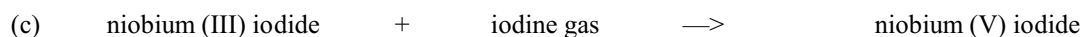
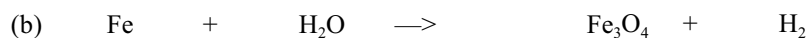
19) The molar mass of a compound is 92 g. Analysis of the compound shows that there are 0.608 grams of nitrogen and 1.388 grams of oxygen in the compound sample. What is the molecular formula of this compound?
 $[\text{N}_2\text{O}_4]$

product
reactant
states of matter symbols
precipitate
aqueous solution
coefficient
balancing equations
law of conservation of mass
double displacement
decomposition
single displacement

combustion
synthesis
activity series
prediction of single displacement products
solubility chart
prediction of double displacement products
limiting reactant
excess reactant
percent yield

20) What does the 4 in $4 \text{Ni}(\text{IO}_3)_2$ mean? _____

21) Write and/or balance the following equations:





22) What are the five common types of reactions? How can you tell which is which?

23) Where are the reactants written in a chemical equation? the products?

24) Write and balance the following equations:

(a) iron (II) sulfide + hydrochloric acid $\longrightarrow$ [double displacement]

(b) barium bromide + fluorine gas $\longrightarrow$ [single displacement]

25) What do the different symbols mean in a reaction equation?

(g) = _____	(l) = _____
↓ = _____	(s) = _____
(aq) = _____	(cr) = _____
↑ = _____	$\longrightarrow$ = _____

acid
base
neutral
properties of acids
properties of bases
pH scale

binary acid
oxyacid
naming acids
neutralization
salt

26) What are three characteristics of acids? _____

27) What are three characteristics of bases? _____

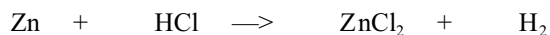
28) Acids produce _____ in water.

- 29) Bases produce _____ in water.
- 30) (a) What is pH? _____
 (b) What pH range is considered acidic? _____ basic? _____ neutral? _____
- 31) Name the following acids:
- | | | | |
|--|-------|------------------------------------|-------|
| (a) HF | _____ | (d) H ₂ CO ₃ | _____ |
| (b) H ₂ C ₂ O ₄ | _____ | (e) HNO ₃ | _____ |
| (c) H ₂ SO ₄ | _____ | (f) HI | _____ |

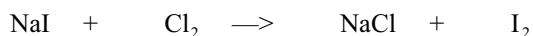
mole ratio
 stoichiometry
 mole-mole stoichiometry

mole-gram stoichiometry
 gram-gram (mass-mass) stoichiometry

- 32) Calculate the mass of hydrochloric acid needed to react with 5.0 g of Zn. [5.6 g]



- 33) How many grams of chlorine gas must be reacted if 8.0 g of sodium chloride are needed? [4.9 g]



- 34) Molten iron and carbon monoxide are **produced** in a blast furnace by the reaction of iron (III) oxide and carbon. If 25.0 g of pure iron (III) oxide are used, how many grams of iron can be produced? [17.5 g]

system
 surroundings
 energy conversion
 exothermic
 endothermic
 energy graphs/diagrams

heat vs. temperature
 direction of heat flow
 stoichiometry with energy
 specific heat calculations
 conduction, convection, and radiation

- 35) A piece of candy contains 53 kJ of energy. How many calories is that?
[13 000 cal or 1.3×10^4 cal]
- 36) Draw the two energy diagrams/graphs for endothermic and exothermic reactions.
(be ready to draw and explain them on the exam)
- 37) A 5.09 g metal sample is heated to 99.6 °C and dumped into 49.00 g of calorimeter water at an initial temperature 19.8 °C. The final (peak) temperature of the water is 21.1 °C. What is the specific heat of the metal?
[0.67 J/g·°C]
- 38) (a) List two examples of exothermic labs or demonstrations: _____

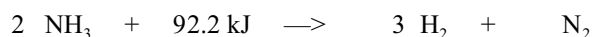
(b) List two examples of endothermic labs or demonstrations: _____

- 39) How much energy is given off when 100.0 grams of hydrogen gas are reacted? [12000kJ]
$$2 \text{ H}_2 + \text{O}_2 \longrightarrow 2 \text{ H}_2\text{O} + 484 \text{ kJ}$$

(b) Is the reaction endothermic or exothermic? _____

40) How much energy is needed to disassociate 34.5 moles of ammonia?

[1590 kJ]



(b) Is the reaction endothermic or exothermic? _____

electronegativity
intramolecular forces
ionic bond
covalent bond
polar covalent bond
intermolecular forces
dispersion

dipole-dipole forces
hydrogen bonding
redox
oxidation
reduction
half-reactions

41) What is electronegativity? _____

42) What element has the (a) highest electronegativity? _____

(b) lowest electronegativity? _____

43) An ionic bond forms between _____

44) A covalent bond forms between _____

45) (a) What are intermolecular forces? _____

(b) What is the strongest intermolecular force? _____

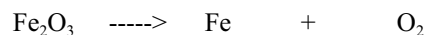
(c) What is the weakest intermolecular force? _____

46) Which three elements are involved in hydrogen bonding? _____

47) What is oxidation? _____

48) What is reduction? _____

49) Write and balance the half-reactions for this redox reaction:



(a) What is oxidized? _____

(b) What is reduced? _____