

Big Time Review

1) Conversions

a) $55\text{Km} = ? \text{ m}$

c) $25\text{mg} = ?\text{g}$

b) $425 \text{ cL} = ? \text{ mL}$

d) $25,000\text{J} = ?\text{kJ}$

2) How many Significant figures?

a) 10.1

b) 0.00556

c) 0.0001

d) 1.0×10^{-3}

3) Calculations with Significant Figures

a) $0.0026 \times 10. = \underline{\hspace{2cm}}$

b) $236.1 + 0.00999 = \underline{\hspace{2cm}}$

c) $102.3 \div .0023 = \underline{\hspace{2cm}}$

d) $0.01256 - 1.096 = \underline{\hspace{2cm}}$

4) Scientific Notation and Sig Figs

a) $0.02568 = \underline{\hspace{2cm}}$

b) $0.000589 = \underline{\hspace{2cm}}$

c) $1.5 \times 10^{-3} \cdot 5.00 \times 10^{+5} = \underline{\hspace{2cm}}$

d) $\frac{1.0 \times 10^{-14}}{1.56 \times 10^{-7}} = \underline{\hspace{2cm}}$

5) In the lab you measure the room temperature to be 23.5°C , but the more actual temperature was 23.2°C . What was your percent error?

6) Give several examples of physical properties.

7) Give several examples of chemical properties.

8) What is the difference between a compound and an element?

9) Explain how a cathode ray tube explained the existence of the electron. Who was credited with the discovery of the electron?

10) Explain how the results of Rutherford's gold foil experiment explained the presence of a dense, positive nucleus.

11) Describe the following:

Atomic number

Mass Number

Average Atomic Mass

12)

| | Name | At # | At Mass | p | n | e | charge |
|----------------------------|------------|------|---------|----|----|----|--------|
| $^{37}_{17}\text{Cl}^{-1}$ | | | | | | | |
| | Bromine-81 | | | | | | 0 |
| | | | | 60 | 86 | | 0 |
| | | | 19 | 8 | | 10 | |
| | | 51 | | | 70 | | +5 |

13) What were Dalton's laws and which ones were not entirely correct? Explain how they were incorrect.

14) Why do colors appear when hydrogen gas is exposed to electric current? Use the Bohr model to explain.

15) What are the major differences between the Quantum Mechanical model and the Bohr model of the atom?

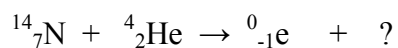
16) In quantum mechanics, what is the volume of space that the electron is probably in called?

Nuclear

17) Explain the differences between make-up and penetrating power for alpha particles, beta particles, and gamma rays.

18) Explain the differences between fission and fusion regarding the fuels and the way reaction occurs.

19) Balance the following nuclear equation:



20) How much energy is in a beam of light with a wavelength of $6.32 \times 10^{-14} \text{m}$?

21) Tungsten has five common isotopes present in the following percentages: tungsten-180 at 0.100%, tungsten 182 at 26.3%, tungsten 183 at 14.3%, tungsten-184 at 30.7%, and tungsten-186 at 28.6%. What is the average atomic mass of tungsten?

Periodic Table

22) What is the periodic Law?

23) On the periodic table, distinguish between:

Periods

Groups

Metals

Non-metals

Semi-Metals

24) On the periodic table identify where to find the:

S-block, D-block, P-Block and F-block

Alkali Metals

Alkali Earth Metals

Transition Metals

Halogens

Noble Gases

Periodic Trends

25) Describe the trends and give a reason for each:

a) Atomic radius

– Why does it get smaller across a period, larger down a family/group?

b) Ionic Size

-Why is an anion larger than a cation from the same period?

c) Electronegativity

Why is it related to the number of protons in the nucleus and number on energy shells?

Chemical Formulae and Bonding

26) What are the difference between a covalent and ionic bonds?

27) Explain how the octet rule can be used to predict the charge of elements in the S and P blocks. Why is this not true of the D block?

28) What is a valence electron?

29)

Names

Mg(OH)₂

Na₃N

PCl₃

H₂SO₄

(NH₄)₂CO₃

H₂CO₃

Be(ClO₃)₂

Cu(NO₃)₂

Formulas

Iron (III) Oxide

Potassium bromide

Uranium (II) nitrate

Arsenic pentaiodide

Cesium chromate

Strontium nitrite

Titanium (V) oxide

Chromium (I) chromate

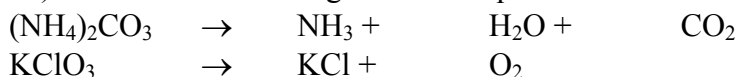
Aluminum sulfate pentahydrate

30) Draw the Lewis dot structures for the following molecules and determine if they are polar
Methanol(CH₃OH) Nitrogen tribromide Carbon dioxide Dihydrogen monoxide CH₄

Chemical Reactions and Equations

31) Why must a chemical equation be balanced?

32) Balance the following chemical equations.



33) Calcium phosphate and silicon dioxide are mixed to produce tetraphosphorus decaoxide and calcium silicate (CaSiO₃).

34) Phosphorus pentachloride and water react to produce phosphoric and hydrochloric acids

35) Give an example of the following types of reactions:

a) Direct combination

b) Single replacement

c) Double replacement

d) Decomposition

e) Combustion

36) Write the balanced equation and determine type of reaction:

a) Copper (III) chloride reacts with sulfur to produce a gas and a salt.

b) Calcium carbonate is heated to produce an oxide and a gas.

Hint: the gas puts out fires.

- c) Magnesium hydroxide and phosphoric acid neutralize each other.
- d) Uranium metal reacts with concentrated sulfuric acid to produce a gas and a uranium (III) salt.
- e) Nickel (II) bromide and sodium phosphate yield

37) What is the percent composition of calcium in calcium phosphate?

Stoichiometry

38) In #36a, how many liters of gas at STP would be produced from the reaction of 16.5g of copper(III)chloride with excess sulfur?

39) In #36a, how many formula units of the salt are created from a reaction with 5.38g of sulfur reacting with excess copper(III)chloride?

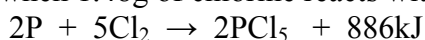
40) In #36a, how many atoms of sulfur were reacted with excess copper(III)chloride if 83.5g of the gas was created?

Energy

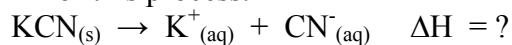
41) How much would the temperature of water change if 62.5kJ of energy was added to a 3.00kg sample?

42) Calculate the mass of copper placed in 1200.g of water if the specific heat of copper is 0.387J/g°C, the initial temperature of the water was 75.4°C, the final temperature of the water was 95.2°C, and the initial temperature of the copper was 285°C.

43) How much heat will be released when 1.48g of chlorine reacts with excess phosphorus according to the following equation?



44) When a 19.2g sample of KCN dissolves in 65.0g of water in a calorimeter, the temperature drops from 28.1°C to 15.4°C. Calculate the ΔH for this process.



Gases

45) Why do gases become a liquid under high pressures and low temperatures?

46) Explain how the total pressure of a mixture of gases in a container can be determined if the amount of each gas is known.

47) Explain why the volume of each gas in the container is the same as the size of the container regardless of how much of each gas is present.

48) If equal parts of 3 gases totaling 4.38 moles of gas were added to a 6.03L container at 305K, then what is the partial pressure of each gas?

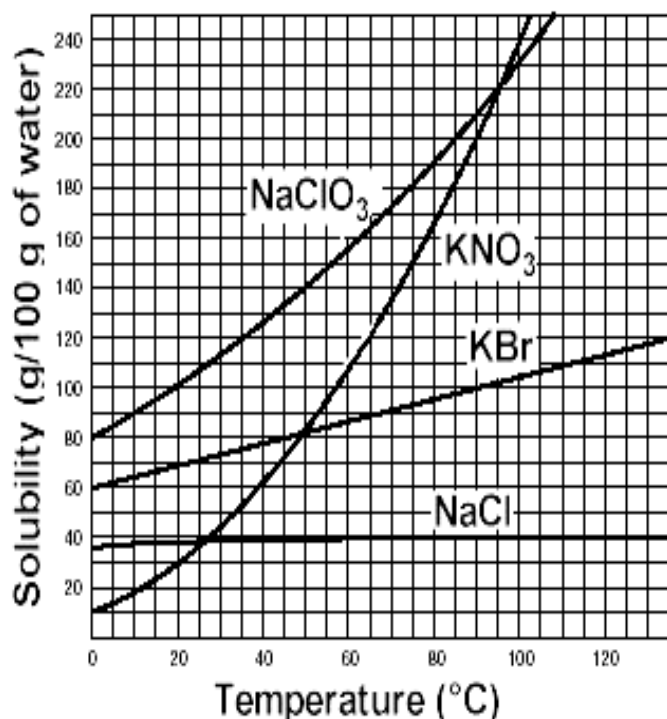
49) In question #43, if 43L of chlorine gas was consumed in the reaction at 1.04atm of pressure and 289K, then how many grams of PCl_5 would you expect to produce? How much energy in Joules?

Solutions

50) Can you make 100mL's of a 0.25M solution from 10mL of a 5.0M solution, if so explain how!

51) Explain how you can make 250mL's of a 0.68M NaOH solution from solid NaOH.

52) What is the only thing that you can do to a solution to change the amount of solute that can be dissolved if you cannot change the amount of solvent?



53) How much NaClO₃ can be dissolved in 100g of water at 65°C?

54) How much KBr can be dissolved in 45g water at 80°C?

55) How much KNO₃ will precipitate if 80g was dissolved in 100g of water and the temperature of the water was lowered to 20°C?

Acids and Bases

56) What is the pH of a solution if the concentration of NaOH is $2.3 \times 10^{-5} \text{M}$?

57) Define an acid and a base using the Arrhenius and the Bronsted-Lowry definitions.

58) Explain how adding base to acid produces a neutral solution.

59) What is the $[H^+]$ in a solution that has a pH of 3.8? What would the pOH be? $[OH^-]$?

Equilibrium

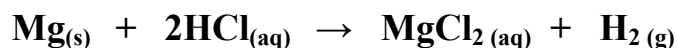
60) In the following reaction, explain two things that can be done to shift the equilibrium to produce more products:



61) Write the k_{eq} expression for the previous reaction and explain how the k_{eq} value can tell you whether you will find more products or more reactants when the equilibrium is reached

Misc. Calculations

Use the following equation for 62-65



62) If the hydrogen gas was collected in a 0.25L container under 125Kpa of pressure at 28°C, then how many grams of Magnesium were reacted?

63) If 58mL of a 0.15M HCl solution was used to react excess magnesium, then how many formula units of Magnesium Chloride were produced?

64) If the pH of the starting solution was 3.8 and 50mL was used, then how many hydrogen atoms were produced?

65) What is the percent yield if only 43.2mL of hydrogen gas was collected at 752.5mmHg and 22.3°C, and 0.52g of magnesium was reacted with excess hydrochloric acid?

66) What was the pH of the original HCl solution if 25mL of acid was titrated with 0.2M NaOH and the phenolphthalein changed color after 45mL of base was added.

67) If the half-life of a radioisotope is 5.62 days. How many grams of a 58 gram sample will be left after 33.72 days.

68) If 85 mL's of a gas at STP is compressed into a 0.02L container at 25°C, then what was the final pressure in Kpa?