

Packet 1

1. How many sig figs are in the following?

- a. 3050 m _____ b. 0.0023 mol _____ c. 3.20×10^4 g _____ d. 200.0 ft _____

2. Round 23958 to 3 sig figs: _____

3. Do the following calculations, paying attention to sig figs & units:

- a. $23.4 \text{ m} + 5 \text{ m} =$ _____ b. $2.5 \text{ cm} \times 3.1 \text{ cm} \times 5 \text{ cm} =$ _____ c. $15.5 \text{ g} \div 3.2 \text{ L} =$ _____

4. A standard bucket can hold 4.5 _____ of water, and is 0.3 _____ tall. [mL, L, kL, mm, cm, m, km]

5. What is the density of a box 11 cm x 12 cm x 12 cm weighing 325 g? ($1 \text{ cm}^3 = 1 \text{ mL}$)

Ans: _____

6. Convert the following using dimensional analysis:

- a. 3.50 km ---> m _____

- b. 55 mi/hr ---> m/sec _____

- c. 99 in^2 ---> ft^2 _____

Also know: physical vs. chem, how to read grad. cylinders, phase diagrams, quantum #

Packet 2

7. Write the complete symbol for the element with 33 protons, 35 neutrons, and 30 electrons:

8. Determine the # of p, n, & e for copper-65:

p = _____ n = _____ e = _____

9. Element X has 2 isotopes: X-34 weighs 33.984 amu and is 45% abundant
X-37 weighs 36.611 amu and is 55% abundant

What is the average atomic weight for element X?

Ans: _____

10. Using the short-cut method, write the electronic configuration for indium: _____

11. How many electrons can fit in the 2nd energy level? _____

Packet 3

12. Give the formula for the following:

carbonic acid _____ magnesium bromide _____ cobalt (II) carbonate _____

13. Give the name for the following:

CrCl_3 _____ HCN _____ $\text{Li}_2\text{C}_2\text{O}_4$ _____

14. Draw the Lewis structure for SO₃ (sulfur trioxide):

What is its electronic geometry? _____

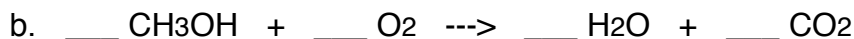
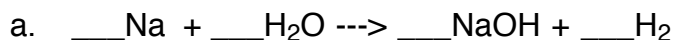
What is its molecular geometry? _____

Is it polar or nonpolar? _____

What is the oxidation # for the sulfur? _____

Packet 4

15. Balance these chemical equations:



16. **Al(OH)₃ + 3 HI ---> 3 H₂O + AlI₃** (use this equation for #16)

a. How many grams of hydroiodic acid are needed to react with 7.5 moles of aluminum hydroxide?

Ans: _____

b. If you start with 55.2 grams of aluminum hydroxide and 55.2 grams of hydroiodic acid, how many grams of aluminum iodide can be produced?

c. Suppose you actually make 52.0 g of aluminum iodide. What is your % yield?

Ans: _____

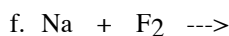
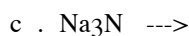
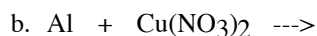
Ans: _____

d. Calculate the amount of excess you have left-over:

Ans: _____

17. **Predict the following products:**

(For single replacement reactions, use the activity series to determine whether or not the reaction will occur. If **YES**, then write the products -- if **NO**, then write "N.R." for "no reaction")



Packet 5

18. What is the density of bromine gas at 15.0 psi and 167°C?
(use ideal gas law)

19. A 25.0 L sample of CO₂ is at STP. What will be its volume if the temperature is increased to 125°C and the pressure decreased to 0.78 atm? (use combined gas law)

Li
K
Ca
Na
Mg
Al
Mn
Zn
Cr
Fe
Cd
Co
Ni
Sn
Pb
H
Cu
Hg
Ag
Pt
Au

20. 5.00 grams of He and 5.00 grams of Ar are placed in a 23.0 L flask at 7.00 atm.

a. What is the partial pressure of each gas?

He: _____

Ar: _____

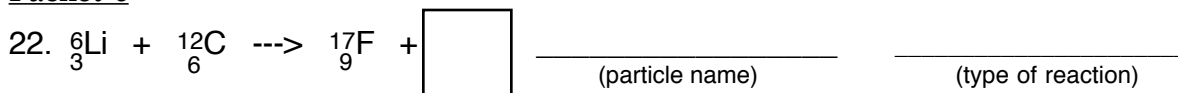
b. What is the temperature of the mixture, in °C?

Ans: _____

c. Which gas is moving faster? _____ (use Graham's Law)

21. H₂ and O₂ are in the same flask. If the H₂ is moving at 755 mph, how fast is the O₂ moving?

Packet 6



24. How much of a 140 g sample of lead will remain after 72 years, given that its half-life is 22 years?

25. If a newly cut piece of wood gives a C-14 Geiger tube reading of 215 cpm, and an artifact gives a reading of 68 cpm, how old is the artifact?

$\begin{matrix} A \\ X \\ Z \end{matrix}$

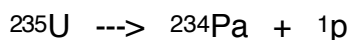
$J = \text{kg} \cdot (\text{m/s})^2$
 $\Delta E = \Delta mc^2$
 $c = 3.00 \times 10^8 \text{ m/s}$

Table 20.3 Masses of Some Nuclei and Other Atomic Particles*

Symbol	Z	A	Mass (amu)	Symbol	Z	A	Mass (amu)
e ⁻	-1	0	0.000549	Co	27	59	58.9184
n	0	1	1.00867	Ni	28	58	57.9199
H or p	1	1	1.00728	Pb	82	206	205.9295
	1	2	2.01345		82	207	206.9309
	1	3	3.01550		82	208	207.9316
He	2	3	3.01493	Po	84	210	209.9368
	2	4	4.00150		84	218	217.9628
Li	3	6	6.01347	Rn	86	222	221.9703
	3	7	7.01435		88	226	225.9771
Be	4	9	9.00999	Th	90	230	229.9837
	5	10	10.0102		90	234	233.9942
B	5	11	11.0066	Pa	91	234	233.9931
	6	12	11.9967		U	92	233
C	6	13	13.0001	92		234	233.9904
	O	8	16	15.9905	92	235	234.9934
Cr		24	52	51.9273	92	238	238.0003
	Fe	26	56	55.9206	Pu	94	239

*The mass of an atom is obtained by adding the masses of the electrons to the nuclear mass given in this table. For example, the mass of the ¹²C atom is 11.9967 + 6(0.000549) = 12.0000. (From R. C. Weast, ed., *CRC Handbook of Chemistry and Physics*, 59th ed. [Boca Raton, Fla.: CRC Press, Inc., 1978]. With permission of CRC Press, Inc.)

26. Calculate the energy change (per mole) for this nuclear reaction:



...check solutions page for answers...