

Chemistry 112  
Third Hour Exam

Name: \_\_\_\_\_

**Please show all work for partial credit**

1. (12 points) A whale can dive to 7,380 feet where the pressure is 223 atm. Express this pressure in Torr, and lbs/in<sup>2</sup>

Torr

Lbs/in<sup>2</sup>

2. (13 points) Give at least 4 of the basic postulates of the kinetic molecular theory of gases, and tell which of these postulates are incorrect for real gases.

3. (13 points) I have a 2 liter plastic bottle filled with  $N_2$  gas at STP. I am going to place 10 grams of 'dry ice' (solid  $CO_2$ ) in the bottle and screw the cap on tight. When the solid  $CO_2$  completely changes to a gas, what is the total pressure in the bottle and what is the partial pressure of  $N_2$  in the bottle. (Assume the temperature does not change.)

4. (12 points) It takes 40.7 kJ of energy to turn 1 mole of water into a gas at  $100^\circ C$ . When this happens the water gas expands to volume of 30 liters. What is  $q$ ,  $w$  and  $\Delta E$  for this process.

5. (12 points) What is the difference between a constant pressure calorimeter and a constant volume calorimeter and what kind of energy does each calorimeter measure?

6. (13 points) One of the reactions you did in lab was  $\text{Cu(OH)}_2(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{H}_2\text{O}(\text{l})$ . If the  $\Delta H$  of this reaction is  $+8\text{kJ}$ , find the missing  $\Delta H_f$  in the following table:

Substance	$\Delta H_f(\text{kJ/mol})$
$\text{Cu(OH)}_2(\text{s})$	-450
$\text{CuO}(\text{s})$	?
$\text{H}_2\text{O}(\text{l})$	-286

7. (12 points) The NMR in the corner of the lab utilizes electromagnetic pulses with a frequency of 90 MHz. What is the wavelength of this radiation?

8. (12 points) in 1985 a Russian group reported measuring the mass of a neutrino as  $9 \times 10^{-38}$  kg. (This measurement has never been repeated) If the neutrino is traveling at .98 the speed of light, what is the wavelength associated with this elementary particle?

9. (1 point) Do you think you will see flashes of light of this wavelength coming out of the ground at Homestake in a few years?