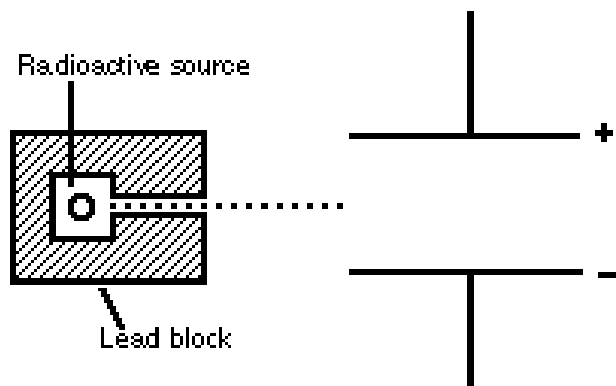


Take Home Exam: Ch 21, 24, 25 Name:  
AP Chem  
(40 pts)

Period: 6 7 Date:  
I have neither given nor received aid on this exam, except from my  
group, NAMES:

Complete in pencil. Erase mistakes completely. If you need more space, use the back of this sheet or attach further sheets as is necessary. For problems involving calculations, **no credit will be given if work is not shown.** Your goal for the AP Exam should be to finish each in about 10 minutes (except #3).

- (4 pts) Explain each of the following in terms of nuclear models.
  - (2 pts) The mass of an atom of  ${}^4\text{He}$  is less than the sum of the masses of 2 protons, 2 neutrons, and 2 electrons.
  
  
  
  
  
  
  
  
  
  
  - (2 pts) Nuclear fusion requires large amounts of energy and to get started, whereas nuclear fission can occur spontaneously, although both processes release energy.
  
- (7 pts) Answer each of the following questions regarding radioactivity.
  - (2 pts) Write the nuclear equation for decay of  ${}^{234}_{94}\text{Pu}$  by alpha emission.
  
  
  
  
  
  
  
  
  
  
  - (2 pts) If its half-life is 138 days, how much time must pass before only 5% of the original sample is still radioactive?
  
  
  
  
  
  
  
  
  
  
  - (3 pts) Describe and draw how  $\alpha$ ,  $\beta$ , and  $\gamma$  rays each behave when they pass through an electric field (pass through the space between a positively-charged plate and a negatively-charged plate. Use the diagram below to illustrate your answer.



- (3 pts) Dimethyl ether,  $\text{H}_3\text{C-O-CH}_3$ , is not very soluble in water. Draw one structural isomer of dimethyl ether that is much more soluble in water and explain the basis of its increased water solubility.

4. (10 pts) Assume that you have two different gases that you know are not cyclic compounds (i.e., not ring structures); analysis of each yielded the same results: C = 85.7%, H = 14.3%. Each gas has a molecular weight of 56. grams.
- (2 pts) What is the molecular formula for the compounds?
  - (8 pts) Draw and name the four possible non-cyclic isomers with this molecular formula. (Draw and name one isomer in each box below.)


5. (16 pts) Give the formulas to show the reactants and the products for ALL the following chemical reactions. Each occurs in aqueous solution unless otherwise indicated. Represent substances in solution as ions if the substance is extensively ionized. Omit formulas for any ions or molecules that are unchanged by the reaction. In all cases a reaction occurs. You need not balance.
- A concentrated solution of ammonia is added to a suspension of zinc hydroxide.
  - A concentrated solution of ammonia is added to a solution of copper(II) chloride.
  - Excess concentrated ammonia solution is added to a suspension of silver chloride.
  - Propene reacts with water in the presence of a catalyst.
  - Methyl iodide is heated with a solution of sodium hydroxide.
  - 2-heptanol is completely burned in air.
  - Ammonia gas is bubbled into a solution of ethanoic acid.
  - Ethene gas is bubbled through a solution of bromine.