

Chemistry 4B SP21 Exam II

Name _____

SID _____

1 (10 pts; 5 each) Briefly rationalize the following observations regarding the cosmic abundance of the elements:

a) Even Z nuclei are more abundant than odd Z nuclei

b) In the lighter elements, those with mass number divisible by 4 are more abundant

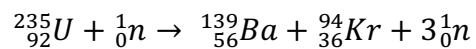
2. (10 pts; 5 each) Write balanced equations that represent the following nuclear reactions:

a) Positron emission by ${}_{11}^{22}\text{Na}$

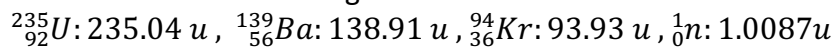
b) Alpha emission by ${}_{88}^{222}\text{Ra}$

3 (10 pts)

One fission reaction that takes place in nuclear reactors is:



Calculate the energy released (in joules) when 5.0 g of uranium-235 undergoes this reaction. Use the following masses:



4 (10 pts)

A 250. mg sample of carbon from a piece of cloth excavated from an ancient tomb in Nubia undergoes 1.50×10^3 disintegrations in 10.0 h. If a current 1.00 g sample of carbon shows 921 disintegrations per hour, how old is the cloth?

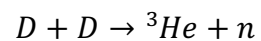
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5 (10 pts).

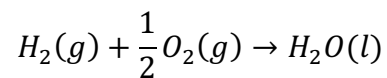
Calculate the energy released per gram of starting material in the fusion reaction represented by the following equation:



Use the following masses: D : 2.0141 u , ${}^3\text{He}$: 3.0160 u

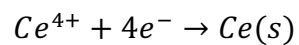
6 (10 PTS)

Consider the fuel cell that accomplishes the overall reaction:



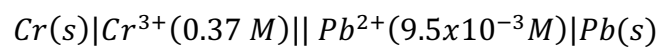
If the fuel cell operates with 60% efficiency, calculate the amount of electrical work generated per gram of water produced. The gas pressures are constant at 1 atm and the temperature is 25° C.

7 (15 PTS). Using the given standard reduction potentials, determine the standard potential for the reaction:



8 (15 pts).

Determine the potential for the following cell @ 25° C



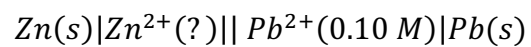
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9 (10 pts).

The potential for the cell @ 25° C

is +0.661 V. What is the concentration of Zn^{2+} ions??