

Exam Number 2

Name: _____

Date: _____

Welcome to the second exam. There are 20 points, total, available. It is vitally important that you show your work both on this exam. No work shown means no credit. Obviously with multiple choice answers there will be no work to be shown, but otherwise, if you think of it, write it down. Exams sheets should be filled out electronically or can be printed, completed and scanned. Attach the completed exam to the exam submission link. If you have any questions, do not hesitate to contact me via email. All answers will be based on the periodic table below. Good Luck!

hydrogen 1 H <small>1.0079</small>																	helium 2 He <small>4.0026</small>						
lithium 3 Li <small>6.941</small>	beryllium 4 Be <small>9.0122</small>																	boron 5 B <small>10.811</small>	carbon 6 C <small>12.011</small>	nitrogen 7 N <small>14.007</small>	oxygen 8 O <small>15.999</small>	fluorine 9 F <small>18.998</small>	neon 10 Ne <small>20.180</small>
sodium 11 Na <small>22.990</small>	magnesium 12 Mg <small>24.305</small>																	aluminum 13 Al <small>26.982</small>	silicon 14 Si <small>28.086</small>	phosphorus 15 P <small>30.974</small>	sulfur 16 S <small>32.065</small>	chlorine 17 Cl <small>35.453</small>	argon 18 Ar <small>39.948</small>
potassium 19 K <small>39.098</small>	calcium 20 Ca <small>40.078</small>	scandium 21 Sc <small>44.956</small>	titanium 22 Ti <small>47.867</small>	vanadium 23 V <small>50.942</small>	chromium 24 Cr <small>51.996</small>	manganese 25 Mn <small>54.938</small>	iron 26 Fe <small>55.845</small>	cobalt 27 Co <small>58.933</small>	nickel 28 Ni <small>58.693</small>	copper 29 Cu <small>63.546</small>	zinc 30 Zn <small>65.39</small>	gallium 31 Ga <small>69.723</small>	germanium 32 Ge <small>72.61</small>	arsenic 33 As <small>74.922</small>	selenium 34 Se <small>78.96</small>	bromine 35 Br <small>79.904</small>	krypton 36 Kr <small>83.80</small>						
rubidium 37 Rb <small>85.468</small>	strontium 38 Sr <small>87.62</small>	yttrium 39 Y <small>88.906</small>	zirconium 40 Zr <small>91.224</small>	niobium 41 Nb <small>92.906</small>	molybdenum 42 Mo <small>95.94</small>	technetium 43 Tc <small>[98]</small>	ruthenium 44 Ru <small>101.07</small>	rhodium 45 Rh <small>102.91</small>	palladium 46 Pd <small>106.42</small>	silver 47 Ag <small>107.87</small>	cadmium 48 Cd <small>112.41</small>	indium 49 In <small>114.82</small>	tin 50 Sn <small>118.71</small>	antimony 51 Sb <small>121.76</small>	tellurium 52 Te <small>127.60</small>	iodine 53 I <small>126.90</small>	xenon 54 Xe <small>131.29</small>						
cesium 55 Cs <small>132.91</small>	barium 56 Ba <small>137.33</small>	* 57-70 *	lutetium 71 Lu <small>174.97</small>	hafnium 72 Hf <small>178.49</small>	tantalum 73 Ta <small>180.95</small>	tungsten 74 W <small>183.84</small>	rhenium 75 Re <small>186.21</small>	osmium 76 Os <small>190.23</small>	iridium 77 Ir <small>192.22</small>	platinum 78 Pt <small>195.08</small>	gold 79 Au <small>196.97</small>	mercury 80 Hg <small>200.59</small>	thallium 81 Tl <small>204.38</small>	lead 82 Pb <small>207.2</small>	bismuth 83 Bi <small>208.98</small>	polonium 84 Po <small>[209]</small>	astatine 85 At <small>[210]</small>	radon 86 Rn <small>[222]</small>					
francium 87 Fr <small>[223]</small>	radium 88 Ra <small>[226]</small>	** 89-102 **	lawrencium 103 Lr <small>[262]</small>	rutherfordium 104 Rf <small>[261]</small>	dubnium 105 Db <small>[262]</small>	seaborgium 106 Sg <small>[266]</small>	bohrium 107 Bh <small>[264]</small>	hassium 108 Hs <small>[269]</small>	meitnerium 109 Mt <small>[268]</small>	ununilium 110 Uun <small>[271]</small>	unununium 111 Uuu <small>[272]</small>	ununbium 112 Uub <small>[277]</small>	ununquadium 114 Uuq <small>[289]</small>										
* Lanthanide series		lanthanum 57 La <small>138.91</small>	cerium 58 Ce <small>140.12</small>	praseodymium 59 Pr <small>140.91</small>	neodymium 60 Nd <small>144.24</small>	promethium 61 Pm <small>[145]</small>	samarium 62 Sm <small>150.36</small>	europium 63 Eu <small>151.96</small>	gadolinium 64 Gd <small>157.25</small>	terbium 65 Tb <small>158.93</small>	dysprosium 66 Dy <small>162.50</small>	holmium 67 Ho <small>164.93</small>	erbium 68 Er <small>167.26</small>	thulium 69 Tm <small>168.93</small>	ytterbium 70 Yb <small>173.04</small>								
** Actinide series		actinium 89 Ac <small>[227]</small>	thorium 90 Th <small>232.04</small>	protactinium 91 Pa <small>231.04</small>	uranium 92 U <small>238.03</small>	neptunium 93 Np <small>[237]</small>	plutonium 94 Pu <small>[244]</small>	americium 95 Am <small>[243]</small>	curium 96 Cm <small>[247]</small>	berkelium 97 Bk <small>[247]</small>	californium 98 Cf <small>[251]</small>	einsteinium 99 Es <small>[252]</small>	fermium 100 Fm <small>[257]</small>	mendelevium 101 Md <small>[258]</small>	nobelium 102 No <small>[259]</small>								

Question 1 (1 Points)

When an atom Beta Minus decays....

- a. A proton is converted into a neutron.
- b. A neutron is converted to a proton.
- c. A proton is converted to an electron
- d. None of the above

Question 2 (2 Points)

Using the snippet of the Table of Nuclides below. Use arrows to show how Si-32 decays.

P32 14.262 d 1+	P33 25.34 d 1/2+	P34 12.43 s 1+
β^-	β^-	β^-
Si31 157.3 m 3/2+	Si32 172 y 0+	Si33 6.18 s
β^-	β^-	β^-
Al30 3.60 s 3+	Al31 644 ms (3/2,5/2)+	Al32 33 ms 1+
β^-	β^-	β^-

Question 3 (2 Points)

What would be the resultant atom should ${}_{90}^{224}\text{Th}$ alpha decay?

Question 4 (2 Points)

A collision where a neutron collides with nucleus, exchanges some of its kinetic energy, the nucleus is not excited is called a(n) _____

- a. Elastic Collision
- b. Inelastic Collision
- c. Absorption Phenomena
- d. Fission Event

Question 5 (1 Point)

True or False: When ${}_{92}^{235}\text{U}$ fissions, it separates into the same two atoms each time.

Question 6 (2 Points)

Write the equation for a Beta Plus decay of the following atom ${}^Z_A X$.

Question 7 (2 Points)

Draw a rough sketch of the fission yield curve for Uranium-235. Be sure to label both axis.

Question 8 (3 Points)

Given the snippet of the table of nuclides below and given that an alpha particle has a mass of 4.0015 amu would be the resultant energy released should ${}^{224}_{90}\text{Th}$ alpha decay?

Th222 2.8 ms 0+	Th223 0.60 s (5/2)+	Th224 1.05 s 0+
222.0184541	223.0207952	224.0214592
Ac221 52 ms (3/2-)	Ac222 5.0 s 1- *	Ac223 2.10 m (5/2-)
221.0155757	222.0178289	223.019126
Ra220 18 ms 0+	Ra221 28 s 5/2+	Ra222 38.0 s 0+
220.0110147	221.0139078	222.0153618

Question 9 (2 Points)

Given the following equation: $X + x \rightarrow [Z]^* \rightarrow Y^* + y$ complete the following:

= target nucleus

= incident particle

= compound nucleus

= product nucleus (* indicates it possesses excitation energy)

= ejected particle

Question 10 (3 Points)

Given the following information:

$$\text{Mass of } {}_{92}^{235}\text{U} = 235.0440 \text{ AMU}$$

$$\text{Mass of } {}_{36}^{92}\text{Kr} = 93.9154 \text{ AMU}$$

$$\text{Mass of } {}_{56}^{141}\text{Ba} = 235.0440 \text{ AMU}$$

An atom of U-235 absorbs a neutron and fissions into 1 atom of Kr-92, 1 atom of Ba-141 and three neutrons.

How much energy is released from this event?