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| **WASHINGTON LATIN PUBLIC CHARTER SCHOOL****CHEMISTRY 2019-20** **UNIT 6 TEST – RADIOACTIVITY AND NUCLEAR REACTIONS** Answer all questionsRecommended time = 25 minutesYou will need a Periodic Table and a calculator

|  |  |  |  |
| --- | --- | --- | --- |
|   | Name: |   |   |
|   | Score (open response) | /15 |   |
|   | Score (multiple choice) | /5 |   |
|   | Bonus (Submits quiz on time and in correct format) | /20 |   |
|   | Total: | /40 |   |

   |

**SECTION A - OPEN RESPONSE**

Fill in all green cells

|  |  |  |
| --- | --- | --- |
| **1.**          | Radon is a monatomic gas released naturally by most rocks. All of its isotopes are radioactive; its most abundant isotope, radon-222, is an alpha emitter. |   |
| (a) | Deduce the number of protons and the number of neutrons in an atom of radon-222 |  2 |
|   | Number of protons:Number of neutrons: |   |
| (b) | Complete the equation below (by changing Z, A and E to the correct numbers/symbols) to show the decay of radon-222. | 2 |
|   |  $$ → $$ + $$ |   |
| (c) | Radon-222 has a half-life of 3.8 days.Calculate the time it would take for the activity of radon-222 to fall to 6.25% of its initial intensity. Show your working. | 2 |
|   |   |   |
| (d) | Suggest why it is important to monitor the rate at which different rocks emit radon gas. | 2 |
|   |     |   |
| TOTAL | 8 |

|  |  |  |
| --- | --- | --- |
| **2.** | The sun’s energy comes from the following reaction: $$ + $$ → $$ + $$Nuclear energy on earth is generated by the fission of large atoms such as thorium-232. |   |
| (a) | What type of reaction is $$ + $$ → $$ + $$?Explain your answer. |  2 |
|   |   |
| (b) | State how the fission of thorium-232 is likely to be started. |    1 |
|   |    |
| (c) | The fission of thorium-232 produces xenon-137, two neutrons and one other product.Complete the nuclear equation for this fission reaction by replacing Z, A and E with the correct values/symbols. |     2 |
|   | $$ → $$ + $$ + 2$$  |
| (d) | Explain why this reaction needs to be controlled, and explain how it is controlled. |    2 |
|   |   |
| TOTAL | 7 |

**SECTION B - MULTIPLE CHOICE**

**Do not answer these questions on this sheet**

**Make a note of your answers and enter them in the answer sheet.**

|  |  |
| --- | --- |
| **3.** | Which of the following statements about alpha radiation is true? |
|   | A | It can penetrate skin. |
|   | B | It can travel a long distance through air. |
|   | C | It is very dangerous if inhaled. |
|   | D | When emitted, the atomic number of the nucleus remaining increases by 1 |
| 1 |

|  |  |
| --- | --- |
| **4.** | Which atom would phosphorus-32 turn into if it emitted a beta particle? |
|   | A | Sulfur-33 |
|   | B | Sulfur-32 |
|   | C | Silicon-32 |
|   | D | Silicon-31 |
| 1 |

|  |  |
| --- | --- |
| **5.** | Briana has 1000 atoms of plutonium-239, which has a half-life of 24,000 years.How many plutonium-239 atoms will Briana have left after 48,000 years? |
|   | A | 750 |
|   | B | 500 |
|   | C | 250 |
|   | D | 125 |
| 1 |

|  |  |
| --- | --- |
| **6.** | Which of the following statements is not true? |
|   | A | Joining together hydrogen atoms to make helium atoms releases a lot of energy |
|   | B | There are no nuclear fusion power stations on earth. |
|   | C | Very high temperatures are needed to achieve nuclear fusion. |
|   | D | Nuclear fusion reactions usually produce harmful radioactive waste. |
| 1 |

|  |  |
| --- | --- |
| **7.** | The fusion of helium-3 with nitrogen-14 would produce oxygen-16 and |
|   | A | A proton $$  |
|   | B | A neutron $$  |
|   | C | An alpha particle $$  |
|   | D | A beta particle $$  |
| 1 |

**End of Test**

[**Answer sheet and exit ticket**](https://docs.google.com/forms/d/e/1FAIpQLSd_Ys-EuKkfi0lulbc0PGgdISBmQSeoBMMWgODqfudlpjsD2w/viewform?usp=sf_link)