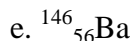
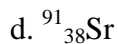
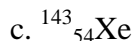
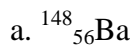
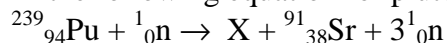


- | | |
|--|------|
| 1. Which of the following is not a mode of nuclear decay?
a. neutron capture
b. positron emission
c. electron capture
d. alpha emission
e. electron emission | 1. a |
| 2. Which one of the following processes results in an increase in the atomic number?
a. gamma emission
b. positron emission
c. beta emission
d. alpha emission
e. corrosion | 2. c |
| 3. What mode of decay is found in heavy elements that is not found in light elements?
a. electron capture
b. electron emission
c. positron emission
d. gamma emission
e. alpha emission | 3. e |
| 4. The only stable isotope of fluorine is $^{19}_9\text{F}$. What type of radioactivity would you expect from the isotope $^{17}_9\text{F}$?
a. $^1_1\text{p}^+$
b. ^1_0n
c. $^0_{-1}\text{e}^-$
d. $^0_{+1}\text{e}^+$
e. ^4_2He | 4. d |

5. Identify the particle X in the following equation for plutonium fission:



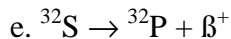
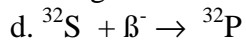
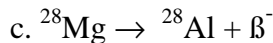
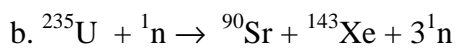
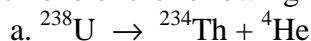
5. e

6. Radioactive nuclei decay

- at a rate characteristic of the particular nucleus.
- with rates that are highly dependent on temperature.
- to produce protons and electrons.
- only by beta emission.
- at the same rate.

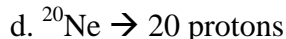
6. a

7. Which one of the following is a fission reaction?



7. b

8. Which one of the following represents the binding energy of ${}^{20}_{10}\text{Ne}$?



8. e

9. Which one of the following is false concerning tritium?

- It is radioactive, emitting alpha particles with a half-life of 12.3 yr.
- It can be produced by neutron bombardment of lithium-6
- It is formed continuously in the upper atmosphere
- It has the same chemical properties as protium but reacts more slowly
- The atomic number of tritium is 1.

9. a

10. The coordination numbers of cobalt(III) and of chromium(III) in their complexes is always
- 4
 - 5
 - 2
 - 3
 - 6
11. Which one of the following complexes has geometric isomers?
- $[\text{Pt}(\text{NH}_3)_3\text{Cl}]^+$ (square planar)
 - $[\text{Co}(\text{NCS})_2\text{Cl}_2]^{2-}$ (tetrahedral)
 - $[\text{Co}(\text{en})_2\text{Cl}_2]^+$
 - $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]^{2+}$
 - $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$
12. The following represents a pair of optical isomers:
(en = ethylenediamine)
- $[\text{CoF}_6]^{3-}$
 - $[\text{Co}(\text{en})\text{Cl}_4]^-$
 - $[\text{Co}(\text{en})_3]^{3+}$
 - trans- $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$
 - cis- $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$
13. A compound has the empirical formula $\text{CoCl}_3 \cdot 5\text{NH}_3$. One mole of this compound yields two moles of $\text{AgCl}(\text{s})$ on treatment with $\text{AgNO}_3(\text{aq})$ in solution. What is the formula of the compound?
- $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 - $[\text{Co}(\text{NH}_3)_5]\text{Cl}_3$
 - $[\text{Co}(\text{NH}_3)_3\text{Cl}_3] \cdot 2\text{NH}_3$
 - $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl} \cdot \text{NH}_3$
 - $[\text{Co}(\text{NH}_3)_2\text{Cl}_2]\text{Cl} \cdot 3\text{NH}_3$
14. Which of the following reactions provides evidence for linkage isomerism?
- $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+} + \text{H}_2\text{O} \rightarrow [\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]^{3+} + \text{Cl}^-$
 - $5\text{H}_2\text{O}_2 + 2\text{KMnO}_4 + 3\text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{MnSO}_4 + 8\text{H}_2\text{O} + 5\text{O}_2$
 - $[\text{Fe}(\text{CN})_6]^{4-} + [\text{IrCl}_6]^{2-} \rightarrow [\text{Fe}(\text{CN})_6]^{3-} + [\text{IrCl}_6]^{3-}$
 - $[\text{Cr}(\text{H}_2\text{O})_5\text{NC}]^{2+} \rightarrow [\text{Cr}(\text{H}_2\text{O})_5\text{CN}]^{2+}$
 - $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+} + [\text{Cr}(\text{H}_2\text{O})_6]^{2+} + 5\text{H}_2\text{O} \rightarrow [\text{Co}(\text{H}_2\text{O})_6]^{2+} + [\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]^{2+} + 5\text{NH}_3$

15. Which one of the following is pentaamminechlorocobalt(III) chloride? 15. b
- a. $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}$
 - b. $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 - c. $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_3$
 - d. $[\text{Co}(\text{NH}_3)_5\text{Cl}]$
 - e. $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_4$
16. Predict the number of unpaired electrons in $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{FeF}_6]^{4-}$, respectively. 16. d
- a. 4 and 0
 - b. 0 and 2
 - c. 0 and 3
 - d. 0 and 4
 - e. 2 and 4
17. Which one of the following complex ions is colorless? 17. b
- a. $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
 - b. $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$
 - c. $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
 - d. $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
 - e. $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$
18. Which one of the following complex ions is paramagnetic? 18. b
- a. $[\text{TiCl}_6]^{2-}$
 - b. $[\text{FeF}_6]^{4-}$ outer orbital
 - c. $[\text{Zn}(\text{NH}_3)_4]^{2+}$
 - d. $[\text{Fe}(\text{CN})_6]^{4-}$ inner orbital
 - e. $[\text{CrO}_4]^{2-}$
19. Consider a complex in which manganese(III) is bonded to six identical ligands. Which one of the following ligands will result in the smallest value of the ligand field splitting? 19. a
- a. Cl^-
 - b. NH_3
 - c. H_2O
 - d. F^-
 - e. CN^-

20. Which of the following is not a normal property of a metal? 20. e
- a. conduction of electricity
 - b. malleability
 - c. ability to form cations
 - d. low electron affinity
 - e. high ionization energy
21. Which element group is the most reactive of all the metallic elements? 21. a
- a. alkali metals
 - b. alkaline earth metals
 - c. coinage metals
 - d. transition metals
 - e. inner transition metals
22. Beryllium differs from the other alkaline earth metals in that its compounds form 22. b
- a. ionic solids
 - b. covalent solids
 - c. molecular solids
 - d. metallic solids
 - e. amorphous solids
23. In addition to sodium and potassium, what other element does lithium resemble chemically? 23. c
- a. He
 - b. Be
 - c. Mg
 - d. Hg
 - e. Pb
24. Which elemental halogen(s) can be used to prepare I_2 from NaI? 24. e
- a. F_2 only
 - b. Cl_2 only
 - c. Br_2 only
 - d. both Cl_2 and Br_2 , but not F_2
 - e. F_2 , Cl_2 , and Br_2
25. The most stable allotrope of oxygen is _____. 25. c
- a. H_2O
 - b. O_3
 - c. O_2
 - d. $HClO$
 - e. O