LEARNING AS ONE NATION

Expanded Project

SHS LEARNING ACTIVITY

Name: _____ **Score/Mark:** _____

Grade and Section: _____ **Date:** _____

Strand: ☐ STEM ☐ ABM ☐ HUMSS ☐ ICT (*TVL Track*)

Subject: *Physical Science (Chemistry)*

Type of Activity: ☑ Concept Notes ☑ Skills: Exercise/Drill ☐ Illustration ☐ Performance Task ☐ Essay/Report ☐ Others: _____

Activity Title: **LA04: Synthesis of Elements – Transuranium Elements**

Learning Targets:
1) To explain how the concept of atomic number led to the synthesis of new elements in the laboratory.
2) To write the nuclear reactions involved in the synthesis of new elements.

Reference: *(Author, Title, Pages)* Sadudaquil, J. A. *CVIF–DLP Learning Activities*

Transuranium elements

- elements that have atomic numbers greater than 92 (***Z* > 92**).
- mainly formed through nuclear transmutation reactions (recall from **LA02**) and are **artificial**, meaning they do not exist naturally and are synthesized in the laboratory only.
- have been successfully synthesized by only a few academic and research institutions in the world.

Exercises:

1) The following reactions show how the last seven elements in the periodic table were formed. Complete the following nuclear transmutation reactions with your periodic table of elements as guide.

$^{208}_{82}\text{Pb} + ^{70}_{30}\text{Zn} \rightarrow ___ + ^{1}_{0}\text{n}$ (a)

$^{209}_{83}\text{Bi} + ^{70}_{30}\text{Zn} \rightarrow ___ + ^{1}_{0}\text{n}$ (b)

$^{237}_{93}\text{Np} + ^{48}_{20}\text{Ca} \rightarrow ___ + ^{1}_{0}\text{n}$ (c)

$^{244}_{94}\text{Pu} + ^{48}_{20}\text{Ca} \rightarrow ___ + 2^{1}_{0}\text{n}$ (d)

$^{243}_{95}\text{Am} + ^{48}_{20}\text{Ca} \rightarrow ___ + 3^{1}_{0}\text{n}$ (e)

$^{243}_{95}\text{Am} + ^{48}_{20}\text{Ca} \rightarrow ___ + 4^{1}_{0}\text{n}$ (f)

$^{248}_{96}\text{Cm} + ^{48}_{20}\text{Ca} \rightarrow ___ + 3^{1}_{0}\text{n}$ (g)

$^{249}_{97}\text{Bk} + ^{48}_{20}\text{Ca} \rightarrow ___ + 3^{1}_{0}\text{n}$ (h)

$^{249}_{97}\text{Bk} + ^{48}_{20}\text{Ca} \rightarrow ___ + 4^{1}_{0}\text{n}$ (i)

$^{249}_{98}\text{Cf} + ^{48}_{20}\text{Ca} \rightarrow ___ + 3^{1}_{0}\text{n}$ (j)

2) From the reactions shown above and from what you have learned on your previous lessons, what scientific law(s) or principle(s) you think is(are) the basis(bases) for the creation of these new elements?