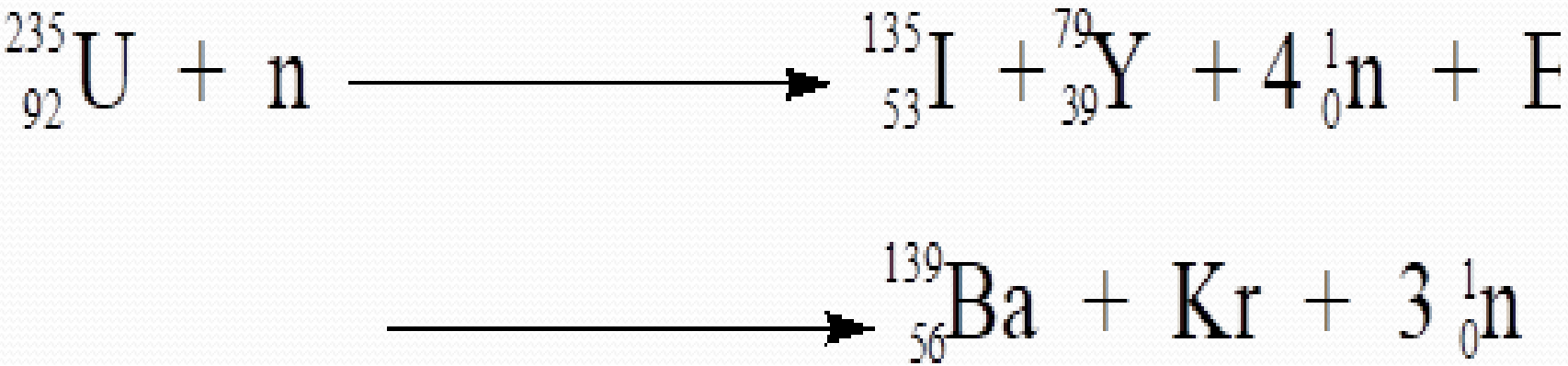
Nuclear fuel:

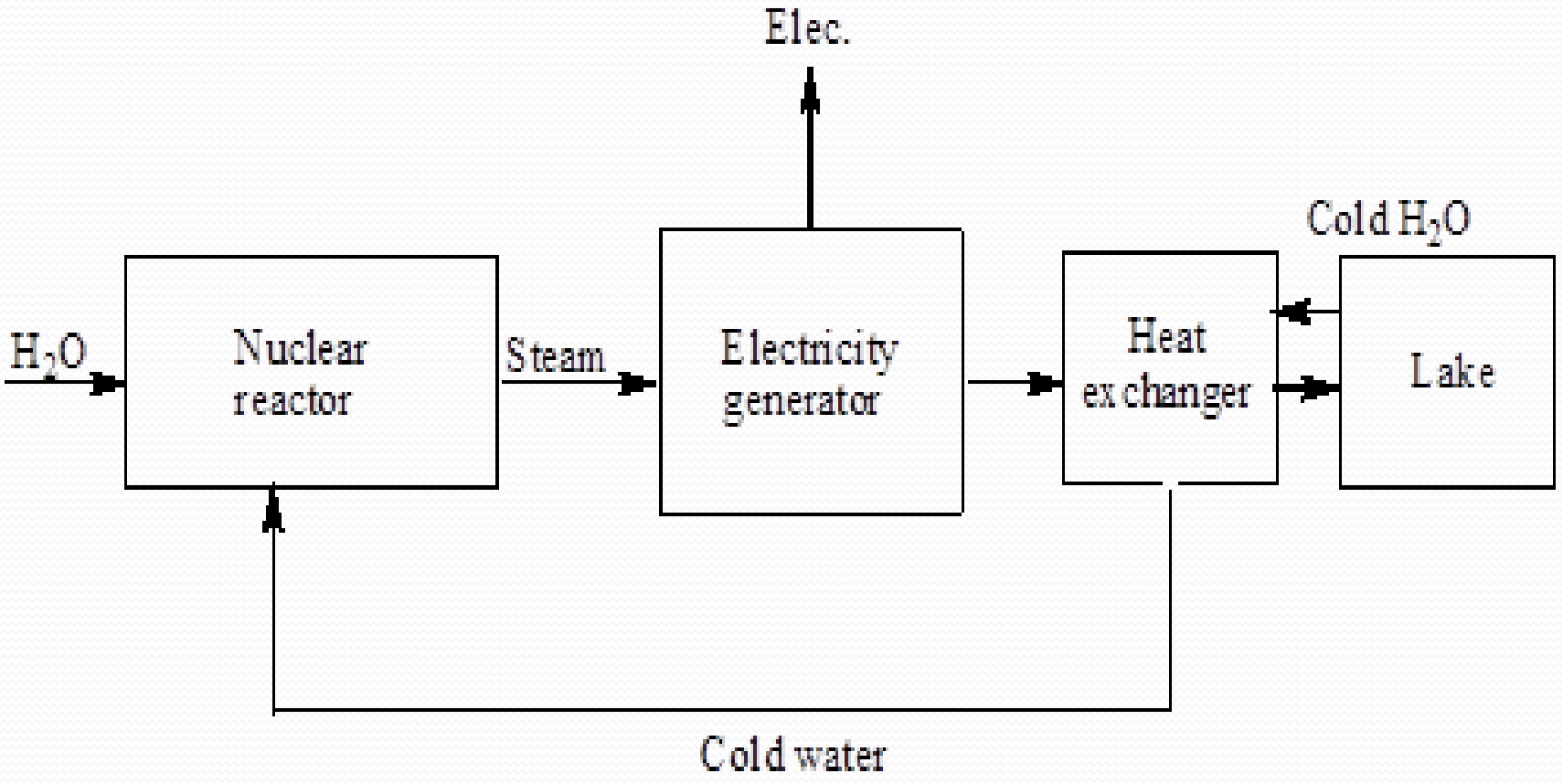
- Nuclear fuel is one of the new sources of energy known to man, dating from about 60 years when the man detonated فجر the first atomic bomb اول قنبلة ذرية during World War II and declared the beginning of the nuclear age اعلن بدء العصر النووي.
- The enormous Energy freed الطاقة الهائلة المتحررة from the nuclear explosion has prompted دفعت scientists to think about controlling this energy and trying to take advantage of it.
- - Uranium is the main raw material used for this purpose.

- Thermal energy can be obtained during two types of nuclear reactions:
- **The first type** is the **nuclear fission reaction** تفاعلات الانشطار النووي using U^{235}, $Pu^{239}$and U^{233} through breeder reaction التفاعلات المتوالدة which use U^{238} & Th^{232} as fuel.
- **The second type** is **nuclear fusion reaction** الاندماج النووي that can use hydrogen as fuel.
- **<u>The nuclear fission reaction</u>** of U^{235} can be expressed in the following equations:

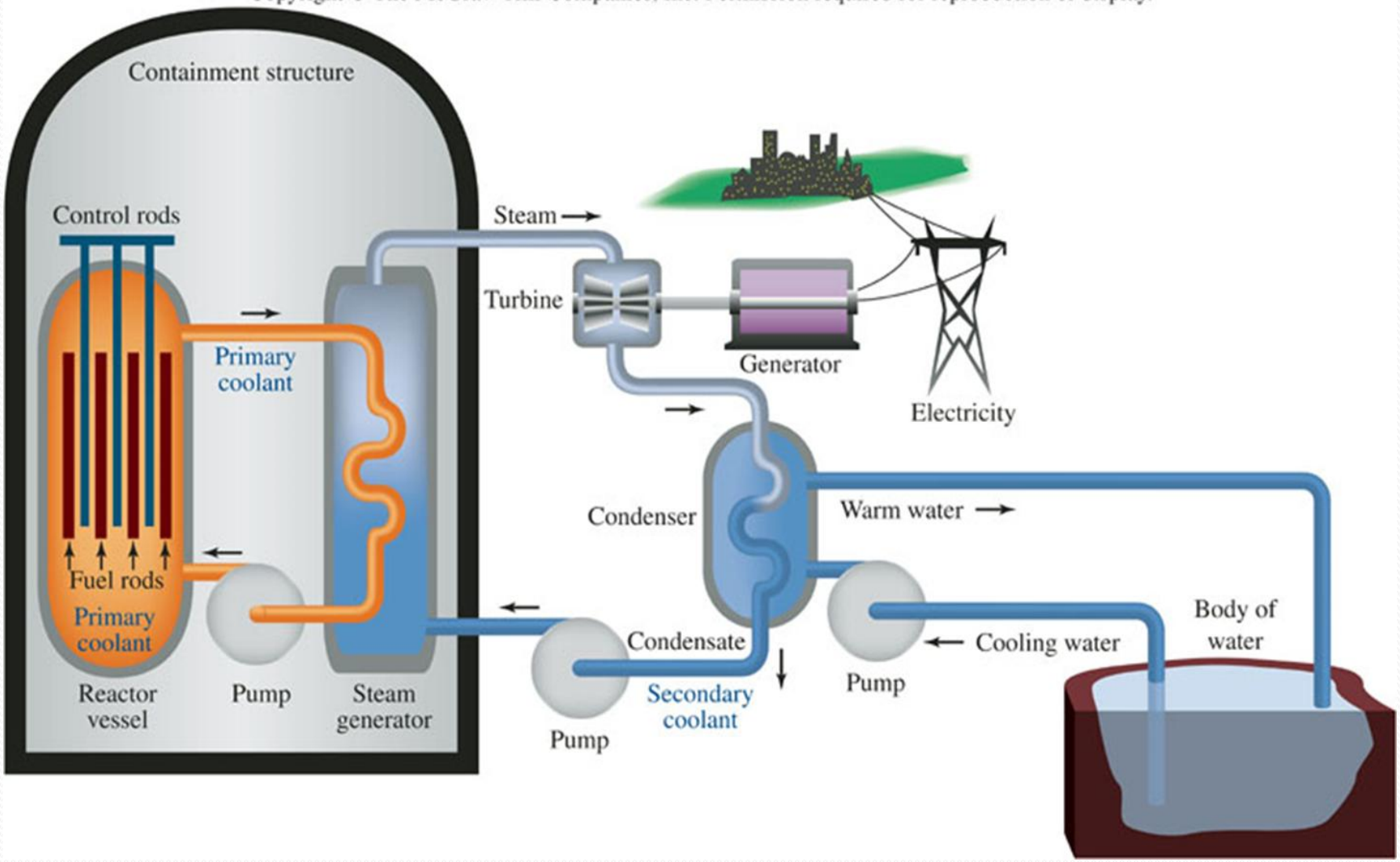
- Another or second type of nuclear reaction is the **nuclear fusion reaction** – where small nuclei are incorporated into larger nuclei – this phenomena produces a very huge amounts of energy much greater than that produced from the nuclear fission reaction. The natural phenomena of these reactions are those happened in the sun.
- No technology could make use of these phenomena, due to the difficulty of controlling this reaction, and no building materials could undertake such high temperature (10^6 Cº).



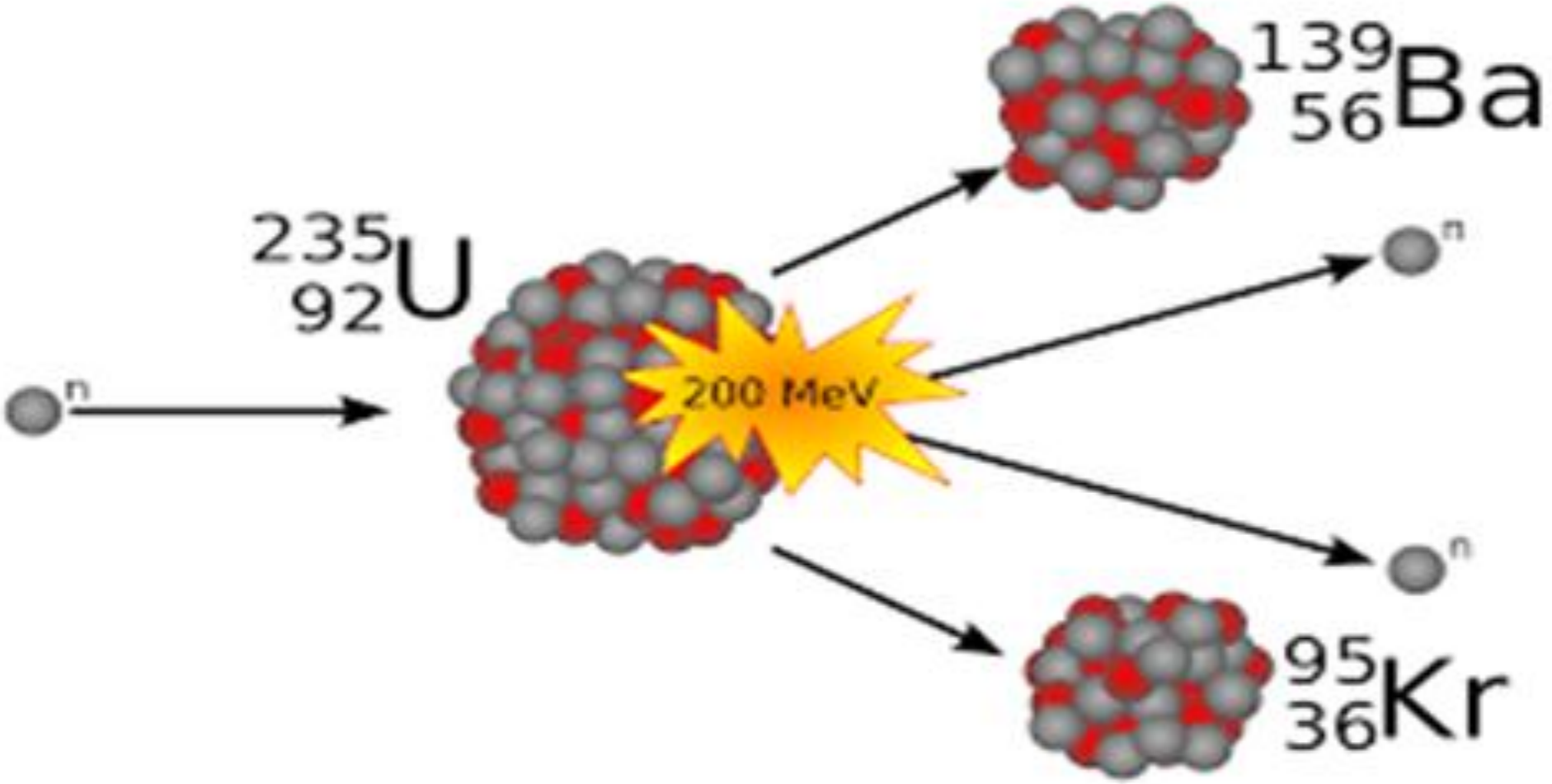
From the equation above we note the existence of وجودseveral paths of radioactive decay of U^{235}, All produce more neutrons than they consumeجميعها تنتج نيوترونات اكثر مما تستهلك.



Nuclear reactor



Uranium is the raw material used for produce energy



- Nuclear reactions result in hazardous waste long-life radioactive waste for several centuries and do not clear method of treating and reducing their risk.
- Twenty years ago there were two catastrophes:
- Grenoble in Ukraine 1986.
- Fukushima in Japan 2011.

- The reserve is enough for millions of year

Peaceful uses of nuclear fuel:

- Power generation
- Sea water desalination
- Research and Scientific studies
- Medicine and Oncology
- Industry and improve agricultural production

Non-Peaceful uses of nuclear fuel:

- Production of bombs and nuclear weapons

- **Disadvantages of nuclear fuel:**
- 1- Environmental disasters
- 2- Industrial waste
- 3- Radically contaminate water