

## Exercise

1. Write the expressions of delta value for O<sup>18</sup> and D separately with respect to VSMOW.
2. Write the complete names of water isotopes reference standards for Oxygen -18 and deuterium measurements.
3. Name the isotopes which are mostly used in hydrology.
4. Name the hydrological processes controlling the distribution of isotopes  
The main hydrological processes that control the distribution of isotopes are:  
Evaporation, condensation
5. Write the full forms of GMWL, RMWL, LMWL and express deuterium excess.
6. What are different isotopic effects and processes responsible for natural variations of stable isotopic composition in precipitation and other water sources?
7. Write equation of d excess.
8. If you collect water samples from the following locations/sources, explain qualitatively (in terms of enriched or depleted) the difference in their isotopic composition/signature of either Oxygen-18 or deuterium
  - i. Precipitation at a location near to coast, 1000km away from the coast in plains area, 1000 km away from the coast with altitude 2000m
  - ii. Lake water from the top surface and at 20 m below the surface during summers
  - iii. Precipitation water, groundwater from shallow aquifer and lake in the same city
  - iv. Isotopic signatures of snow at surface and below 1 meter depth collected from the same location.
- 9) Using the altitude effect in order of -0.3/100m in your study area, suppose O-18 value at altitude 300 is -6‰ the what will be  $\delta^{18}\text{O}$  value at location B at the elevation of 2000 m.
- 10) Construct a local meteoric water line and seawater mixing line using the following data (corresponding to the standard world meteoric water line).

$\delta^{18}\text{O}$	$\delta^2\text{H}$	$\delta^2\text{H}$
I	I	II
-4.12	-24	-24.3
0.79	13	13
-0.73	1.5	-2
-3.45	-15	-22.9
-0.17	-10	-5
-3.21	-20	-23.4
-0.76	-5	-11.9
-3.08	-12	-17.8
-5.51	-37	x

-7.05	-48	x
-6.53	-45	x
-7.28	-50	x

---

I Precipitation

II Groundwater near seacoast