

Water - a most peculiar substance

Describe it



DESCRIBE THE PHASES OF WATER

SOLID

LIQUID

GAS



sublimation
evaporation

precipitation
condensation

Water is the universal solvent

Periodic Table
of the Elements

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----|----|----|-----|----|----|-----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | IA | 1 | H | IIA | 2 | He | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | 3 | Li | 4 | Be | 5 | B | 6 | C | 7 | N | 8 | O | 9 | F | 10 | Ne | | | | | | | | | | | | | | | | | | | | |
| 3 | | 11 | Na | 12 | Mg | 13 | Al | 14 | Si | 15 | P | 16 | S | 17 | Cl | 18 | Ar | | | | | | | | | | | | | | | | | | | | |
| 4 | | 19 | K | 20 | Ca | 21 | Sc | 22 | Ti | 23 | V | 24 | Cr | 25 | Mn | 26 | Fe | 27 | Co | 28 | Ni | 29 | Cu | 30 | Zn | 31 | Ga | 32 | Ge | 33 | As | 34 | Se | 35 | Br | 36 | Kr |
| 5 | | 37 | Rb | 38 | Sr | 39 | Y | 40 | Zr | 41 | Nb | 42 | Mo | 43 | Tc | 44 | Ru | 45 | Rh | 46 | Pd | 47 | Ag | 48 | Cd | 49 | In | 50 | Sn | 51 | Sb | 52 | Te | 53 | I | 54 | Xe |
| 6 | | 55 | Cs | 56 | Ba | 57 | *La | 72 | Hf | 73 | Ta | 74 | W | 75 | Re | 76 | Os | 77 | Ir | 78 | Pt | 79 | Au | 80 | Hg | 81 | Tl | 82 | Pb | 83 | Bi | 84 | Po | 85 | At | 86 | Rn |
| 7 | | 87 | Fr | 88 | Ra | 89 | +Ac | 104 | Rf | 105 | Ha | 106 | 106 | 107 | 107 | 108 | 108 | 109 | 109 | 110 | 110 | 111 | 111 | 112 | 112 | | | | | | | | | | | | |

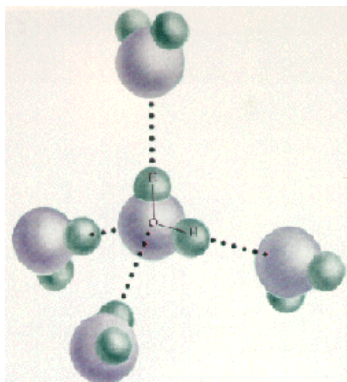
Naming conventions of new elements

* Lanthanide Series

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 |
| Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu |

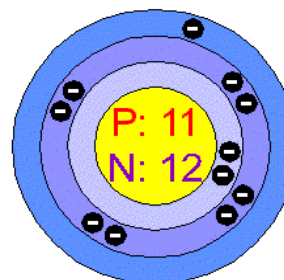
+ Actinide Series

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 |
| Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |

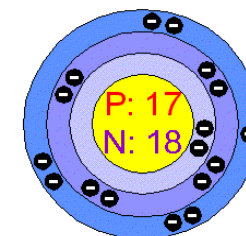


hydrogen bond

Sodium



Chlorine



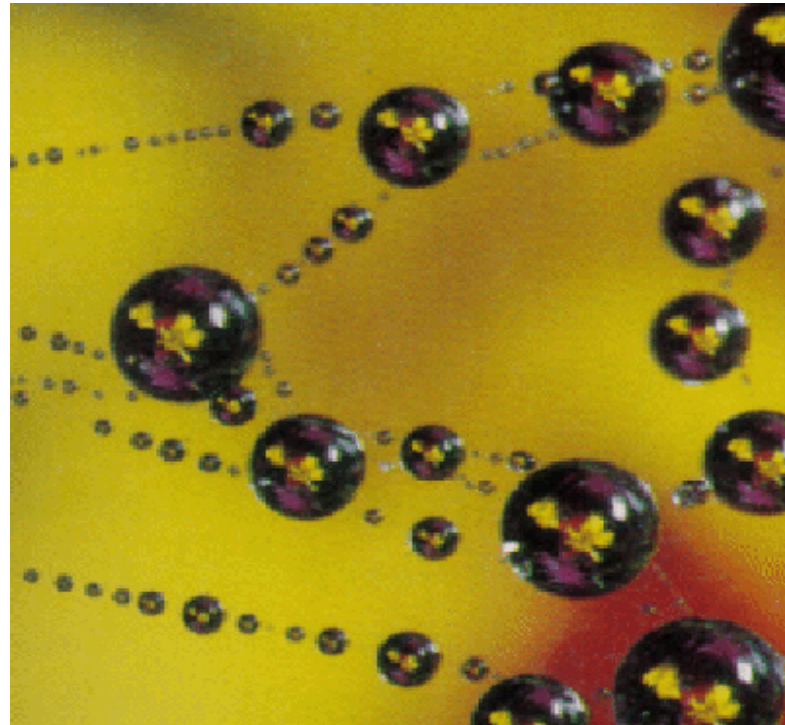
ionic bond

How much of our water supply is fresh water?

- 1. 1/3***
- 2. 3%***
- 3. 10%***

How much is ice?

- 1. 2/3***
- 2. 1/2***
- 3. 1/3***



What dissolves in water? Does life depend on it?

***carbon dioxide
oxygen***

1. Water has a high latent heat of vaporization

Water evaporates slowly from lakes where many life forms are dependent on it

2. Water is a liquid over a wide temperature range

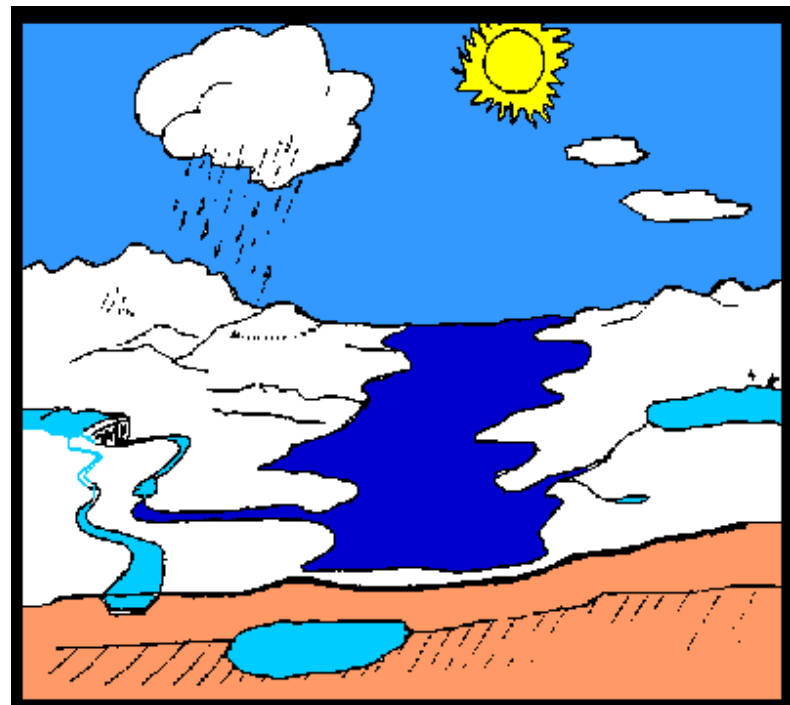
Where does most life live?

3. Water is less dense in its solid state than liquid state

Life lives under ice

4. Water has a very high specific heat

(absorb or lose heat before temperature change)

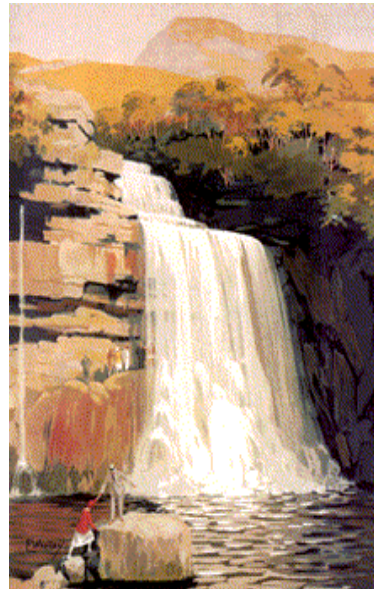


4. *Water exhibits viscosity*

Resistance between layers

deeper areas swift current, shallower less

Formation of eddies

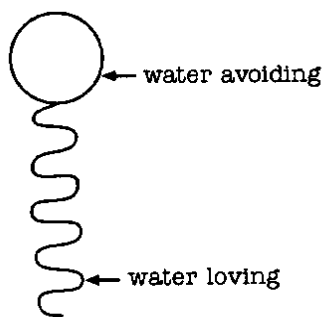
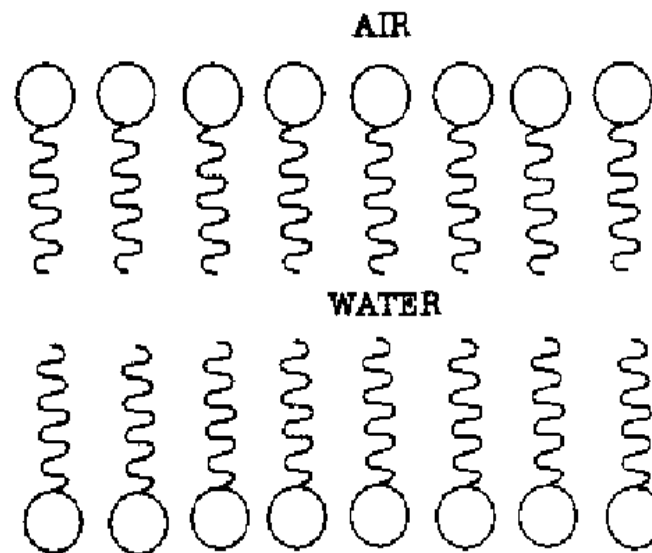
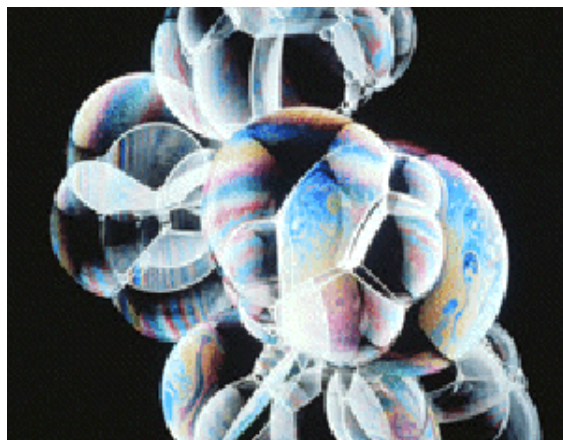


5. Water exhibits surface tension

"Skin" helps organisms to live on the top

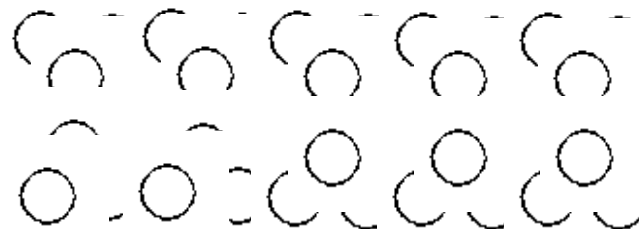




SOAP FILM



Soap or Detergent Molecule

H₂O



| | | |
|---------------|--|--|
| RED |  | VERY STRONGLY ACID pH 2.0 |
| ORANGE |  | STRONGLY ACID pH 4.0 |
| YELLOW |  | WEAKLY ACID pH 6.0 |
| GREEN |  | WEAKLY ALKALINE pH 8.0 |
| BLUE |  | STRONGLY ALKALINE pH 10.0 |