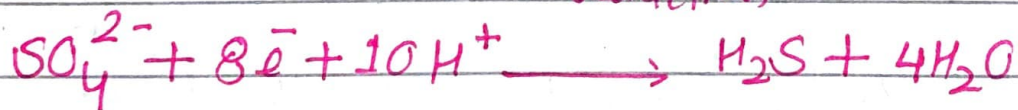
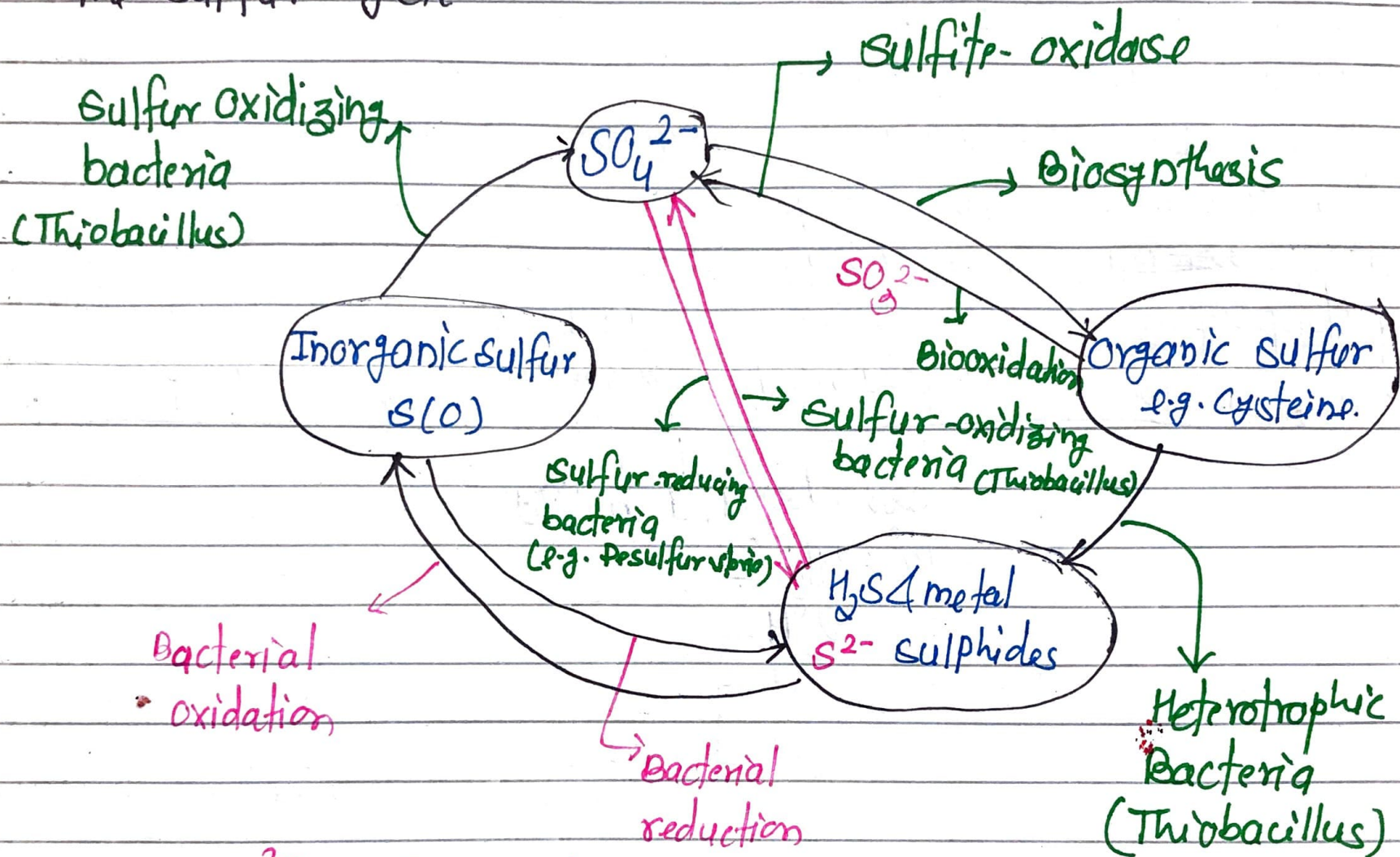


The Sulfur Cycle:



Atmosphere

- The atmosphere is a protective blanket that nurtures life on the Earth and protects it from the hostile environment of outer space.
- The atmosphere is a key constituent of Earth's natural capital.
- Atmosphere is a source of
 - CO_2
 - O_2
 - N_2
 - H_2O
 - other gases

Role of Atmosphere

↓
Transport water from ocean to land

↓
Dumping grounds for many pollutant materials.
e.g. SO_2
chlorofluorocarbons etc.

↓
As a protective shield

- Absorbs most of the cosmic rays from outer space
- Filtering out damaging UV radiations (below 300nm)

↓
Stabilizes the Earth's temperature.

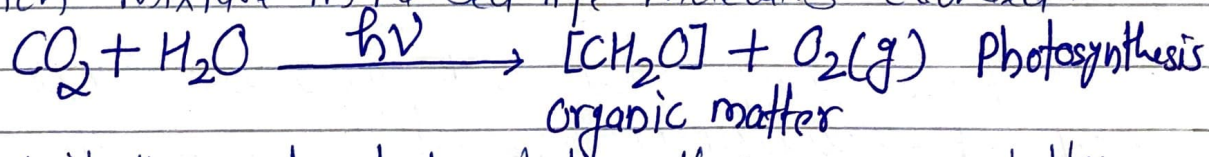
- atmosphere reabsorbs much of the IR radiation by which absorbed solar energy is re-emitted to space.
- Atmosphere preventing the tremendous temp. extremes that occurs on planets and moons lacking substantial atmospheres.

Components of Atmosphere

Major Components	Minor	Trace	Water by Volume
• N_2 78.08%	Ar 0.934%	CH_4, NO_x	0.1 - 5%
O_2 20.95%	CO_2 0.040%	H_2, SO_2	Normal range
	Ne $1.818 \times 10^{-3}\%$	O_3, NH_3	1% - 3%
	He $5.24 \times 10^{-4}\%$	CO, NO_2	
	Kr $1.14 \times 10^{-4}\%$	etc.	
	Xe $8.7 \times 10^{-6}\%$		

Chemical and Biochemical in Evolution of the Atmosphere:

- Approximately 3.5 billion years ago when the first primitive life molecules were, the atmosphere was probably free of O_2 and consisted of a variety of gases such as CO_2 , H_2O vapour and probably CH_4 , NH_3 and H_2 .
- The atmosphere was bombarded by intense, bond breaking UV light which along with lightening and radiation from radionuclides, provided the energy to bring about chemical reactions that resulted in the production of relatively complicated molecules, including even amino acids and sugars. From the rich mixture in the sea life molecules evolved.



- The oxygen initially produced by photosynthesis was probably quite toxic to primitive life forms. However much of this O_2 was converted to Fe_2O_3 by Reaction with soluble $Fe(II)$



Major Regions of the Atmosphere

