

Reactive Oxygen Species I:

- **Definitions**
- **Key reactions**
- **Sources of ROS**
- **Damage to proteins**
- **Damage to lipids**
- **Damage to DNA**
- **Antioxidants**

- The Earth was originally **anoxic**
- Metabolism was **anaerobic**
- O_2 started appearing $\sim 2.5 \times 10^9$ years ago

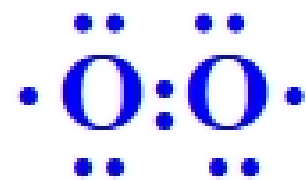
Anaerobic metabolism-glycolysis



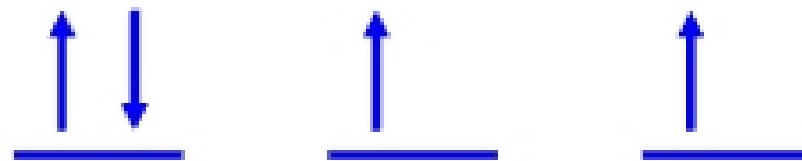
O_2 an electron acceptor in aerobic metabolism



- **Ground-state oxygen has 2-unpaired electrons**



- **The unpaired electrons have parallel spins**



- **Oxygen molecule is minimally reactive due to spin restrictions**