# Lab 03 - Silicate Minerals - Key

1. Si + O
2. in the silicon-oxygen tetrahedron
3. -4 (negative four)
4. no, minerals can not have an electric charge
5. strong covalent bonds
6. weaker ionic bonds
7. strong covalent bonds
8. because quartz has strong covalent bonds it is hard and lacks cleavage
9. very weak Van der Waal's Forces
10. basal or 1 direction of cleavage
11. yes, because they all contain Van der Waal's Forces
12. muscovite is clear; biotite is dark brown to black; chlorite is green
13. all crystals require both time to grow and space to grow in or they will be too small to see
14. augite is dark green and has prismatic cleavage at $90^{o}$ ;
    hornblende is jet black and has prismatic cleavage not at $90^{o}$
15. irregular fracture is grainy-looking and uneven, conchoidal fracture is smooth and rounded like broken glass

| MINERAL | (at least) TWO PHYSICAL PROPERTIES |
|---|---|
| clays | very soft, white powdery |
| talc | very soft, 1 cleavage |
| muscovite | soft, 1 cleavage, clear sheets |
| biotite | soft, 1 cleavage, dark sheets |
| chlorite | soft, 1 cleavage, crushed green mass |
| kyanite | medium, bladded crystals |
| orthoclase | hard, prismatic cleavage, pink |
| Na plagioclase | hard, prismatic cleavage, dirty white |
| Ca Plagioclase | hard, prismatic cleavage, dark gray |
| augite | hard, prismatic cleavage, dark green |
| hornblende | hard, prismatic cleavage, black |
| quartz | H = 7, clear 6 sided crystals |
| garnet | very hard, red rounded crystals |
| olivine | very hard, green glassy grains |