

# SUMMARY OF PHYSICAL PROPERTIES, COLOR AND PHENOMENA IN GEMS AND MINERALS

## I. Physical Properties

### A) Durability

- 1) Hardness -resistance to scratch; Mohs Scale
- 2) Toughness (tenacity) - resistance to breakage
  - a. Cleavage - number of directions, ease of splitting
  - b. Fracture - shape, i.e. conchoidal, splintery
  - c. Parting

### B) Habit - characteristic growth shape of mineral

### C) Luster - character and intensity of light reflected from mineral - metallic, adamantine, vitreous, resinous, chalky, silky

### D) Specific Gravity - weight per unit volume

- 1) Hydrostatic weighing method  
(weight in air) / (weight in air - weight in water)
- 2) Heavy Liquid method - sink, float, suspend test  
- good for small volumes where method a) not as precise

### E) Color

- 1) Allochromatic colors - “other” colored; color by trace amounts coloring substance (chromophore)
  - a) partial absorption of light by transition metal chromophore(s)
  - b) color center(s) - absorption of light by electron trapped in defect (missing atom)
- 2) Idiochromatic colors - “self” colored; color by chromophore that is abundant in mineral
  - a) partial absorption of light by transition metal chromophore(s)

### F) Ultraviolet Fluorescence

- absorption of U.V. light and emission of visible light

### G) Dispersion - prism effect, splitting of light into component wavelengths (colors)

## II. Phenomena

### A) Diffraction

- 1) Play-of-Color; Opal
- 2) Labradorescence; Labradorite Feldspar

**B) Reflection from reflective inclusions within gem or mineral**

- 1) Chatoyance - aligned inclusions
  - a) Cats Eye effect
  - b) Asterism - 4-, 6-, or 12-rayed stars
- 2) Aventurescence - unaligned inclusion
  - a) aventurine quartz - green mica inclusion
  - b) sunstone feldspar - copper inclusions