“special” minerals
Special minerals

Did you have any minerals that were always black?
⇒ Opaque

Minerals like spinel, graphite

http://www.nslc.ucla.edu/pet/thins/jpgs/2.007.jpg
Special minerals 2

Minerals with color, but always extinct (no birefringence)

⇒ Isotropic

e.g. garnet

Also glass

http://www.nslc.ucla.edu/pet/mineral_html/Grossular.html
Shortcuts

Some minerals have special characteristics:

=> No need to apply all observations
Polysynthetic twins

Polysynthetic twins in Ca-Na feldspar (plagioclase):
Looks like pajama stripes
Only grey, white, black interference colors
Tartan twins look like cross-hatched pattern (checkerboard)
Really = 2 twin systems
Found in K feldspar (microcline)
Amphibole

Often green/brown
2nd order interference colors
CLEAVAGE

http://www.uwgb.edu/dutchs/PETROLGY/thin-sec-fotos/CHLOR-P4.JPG
http://www.uwgb.edu/DutchS/GRAPHIC0/ROCKMIN/THINSECT/cleavg.gif
Pyroxene

Often light green
Barely 2nd order interference colors
CLEAVAGE

http://www.science.smith.edu/departments/Geology/Petrology/Petrography/Augite/90Cleavage.jpg
http://www.gly.bris.ac.uk/www/teach/opmin/cleavC.GIF
Mica

Biotite (brown-yellow), muscovite (clear), chlorite (green-yellow)

2nd order interference colors

Cleavage

Speckled texture like goose bumps

http://www.nslc.ucla.edu/pet/thins/jpgs/2.013.jpg
Mica + zircon

Dark spots around zircon in what seems to be a mica
Middle of spot has
  high relief
  mineral
Dark spot = radiation damage

http://www.nslc.ucla.edu/pet/thins/jpgs/2.013.jpg
Carbonate / calcite

Essentially colorless
Highest interference colors:
  mix of
  pastel green
  pastel pink

What are the crossing dark lines?

http://www.agpix.com/catalog/AGPix_mullen/large/AGPix_mullen_0063_Lg.jpg
Textures

A few examples of textures you may run across:
Typically odd arrangement of minerals
Foliation

Metamorphic rocks
⇒ Minerals with preferred orientation

Orientation defined by micas (1x deformed)

http://www.earth.ox.ac.uk/~oesis/micro/medium/schist2_pm04-13.jpg
Funny foliation

Metamorphic rocks

$\Rightarrow$ Mica layers are bent:

Crenulation cleavage

(2x deformed)

(from http://www.geolab.unc.edu/Petunia/IgMetAtlas/mainmenu.html)
Undulatory extinction:

Mineral = bent, so extinction happens when domain aligns with polarizers
Reaction rims

Minerals not in equilibrium with melt:

Reaction dissolving mineral + making new one (in rim)

Extra: inclusions

While minerals grow they can include:
• Other minerals
• Liquids
• Melt

http://minerals.cr.usgs.gov/gips/images/inclulrg.gif

http://f10.aaa.livedoor.jp/~dunite/3nenjpeg/v2-2_pl%20inclusion1_10.JPG