

# ERSC 3P21

## Igneous and Metamorphic Petrology

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## PETRO (rock).....

- **Petrography**  
–
- **Petrology**  
–
- **Petrogenesis**  
–  
–

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## PETRO.....

- Petrographic, petrologic and petrogenetic , studies can be applied to igneous, metamorphic and sedimentary rocks
- Petrography and petrology became important in geology in the mid 19<sup>th</sup> Century with the development of the microscope and the thin section to aid in the description of various rock types

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## IGNEOUS ROCKS

Defined

- 



---

---

---

---

---

---

---

---

## MAGMA

Defined:

- 
- 
- 
- 

• Magma may or may not contain:

- 
- 

ERSC 3P21 - Brock University Greg Finn 2009

---

---

---

---

---

---

---

---

## MAGMA

LIQUID PHASE

- 

- 

ERSC 3P21 - Brock University Greg Finn 2009

---

---

---

---

---

---

---

---

# MAGMA

## GAS PHASE

- 
- 
- 

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

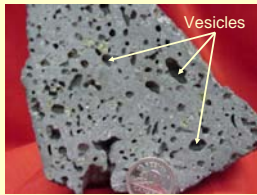
---

---

# MAGMA

## GAS PHASE

- 



ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

# MAGMA

## SOLID PHASE

- 



ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Igneous Rocks

- Igneous rocks are not everywhere abundant on and/or within the Earth, they lack large scale mineral deposits
- Igneous activity (volcanism) provides the only samples available with which we may directly study the composition of the Earth's interior
- Samples the lower crust and upper mantle the outer ~100 km

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Igneous Rocks

- Igneous rocks are extremely variable –
- 2 Possibilities to explain this link:
  1. \_\_\_\_\_ or
  2. \_\_\_\_\_

(the latter is only applicable to restricted locality)

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Igneous Rocks

- Source compositions are sufficiently different, with each composition undergoing similar process(s) after derivation
- These processes, which can effectively change the composition and character of the magma, are termed \_\_\_\_\_ or \_\_\_\_\_ mechanisms
- **Defined:** -

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Generalities Concerning Magmas

### COOLING

1.

–

–

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Generalities Concerning Magmas

### COOLING

2.

–

3.

–

4.

–

–

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Generalities Concerning Magmas

### MAGMATIC TEMPERATURES

Extruded Magmas = \_\_\_\_\_

•

•

– \_\_\_\_\_

- Observed temperature range 900-1500°C, commonly 1000-1200°C

– \_\_\_\_\_

- Observed range 700-1000°C, commonly ~ 800°C

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Generalities Concerning Magmas

### MAGMATIC TEMPERATURES

Intruded Magmas = \_\_\_\_\_

- 
- 
- 

- \_\_\_\_\_ crystallize at ~800-1000°C
- \_\_\_\_\_ crystallize at ~ 600°C

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---

## Generalities Concerning Magmas

### RATES OF ASCENT AND COOLING

These are related to the structure and physical characteristics of the magma body,

- .

- Ascent
  - 
  -
- Cooling
  - 
  -

ERSC 3P21 - Brock University Greg Finn 2005

---

---

---

---

---

---

---

---