



GEOS702

Thermodynamics of Earth Processes

S2 Day 2017

Dept of Earth and Planetary Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	3
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	4
<u>Policies and Procedures</u>	4
<u>Graduate Capabilities</u>	5

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General Information

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Credit points

4

Prerequisites

Admission to MRes

Corequisites

Co-badged status

Unit description

This unit provides the basis for using thermodynamic calculations to aid the interpretation of experimental results. The unit combines experimental and computational methods applied to a number of case studies to allow the student to acquire practical skills applicable to a wide range of research areas. Case studies will include: (i) understanding trace element partitioning and behaviour, (ii) investigating the effect of volatiles on the physics and chemistry of rock properties and melt, (iii) modelling the mineralogy of planetary interiors and (iv) geothermobarometry. Students will acquire skills in the use of standard packages such as Thermocalc and have the opportunity to apply the methods learnt to their own research interest area.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are

available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

- To gain an appreciation of the thermodynamics behind phase diagrams
- To understand the components of the Gibbs Free Energy
- To read and interpret simple geological phase diagrams
- To understand the reasons for and differences between equations of state
- To appreciate various thermodynamic mixing models and their applications
- To calculate a simple phase diagram from thermodynamic data

Assessment Tasks

Name	Weighting	Hurdle	Due
Phase diagrams	30%	No	Weeks 1-3
Mixing models	30%	No	Weeks 4-6
Phase diagram construction	40%	No	Weeks 7-9

Phase diagrams

Due: **Weeks 1-3**

Weighting: **30%**

Read and interpret phase diagrams.

On successful completion you will be able to:

- To gain an appreciation of the thermodynamics behind phase diagrams
- To understand the components of the Gibbs Free Energy
- To read and interpret simple geological phase diagrams
- To appreciate various thermodynamic mixing models and their applications

Mixing models

Due: **Weeks 4-6**

Weighting: **30%**

Calculations involving the application of mixing models to thermodynamic data

On successful completion you will be able to:

- To understand the components of the Gibbs Free Energy

- To understand the reasons for and differences between equations of state
- To appreciate various thermodynamic mixing models and their applications

Phase diagram construction

Due: **Weeks 7-9**

Weighting: **40%**

Calculation of phase diagrams from thermodynamic data using MATLAB

On successful completion you will be able to:

- To gain an appreciation of the thermodynamics behind phase diagrams
- To understand the components of the Gibbs Free Energy
- To read and interpret simple geological phase diagrams
- To understand the reasons for and differences between equations of state
- To appreciate various thermodynamic mixing models and their applications
- To calculate a simple phase diagram from thermodynamic data

Delivery and Resources

All information, including assessment tasks, will be posted on the iLearn page.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of

Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit <ask.mq.edu.au>.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (<mq.edu.au/learningskills>) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at <ask.mq.edu.au>

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcome

- To appreciate various thermodynamic mixing models and their applications

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- To gain an appreciation of the thermodynamics behind phase diagrams
- To understand the components of the Gibbs Free Energy
- To read and interpret simple geological phase diagrams
- To understand the reasons for and differences between equations of state
- To appreciate various thermodynamic mixing models and their applications
- To calculate a simple phase diagram from thermodynamic data

Assessment tasks

- Phase diagrams
- Mixing models
- Phase diagram construction

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- To gain an appreciation of the thermodynamics behind phase diagrams
- To understand the components of the Gibbs Free Energy
- To read and interpret simple geological phase diagrams
- To understand the reasons for and differences between equations of state
- To appreciate various thermodynamic mixing models and their applications
- To calculate a simple phase diagram from thermodynamic data

Assessment tasks

- Phase diagrams
- Mixing models
- Phase diagram construction

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- To gain an appreciation of the thermodynamics behind phase diagrams
- To understand the components of the Gibbs Free Energy
- To read and interpret simple geological phase diagrams
- To understand the reasons for and differences between equations of state
- To appreciate various thermodynamic mixing models and their applications

Assessment tasks

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