

# **CHM3010 (3+1) (Group 2)**

## **Physical and Inorganic Chemistry**

### **Coordinator/lecturer**

- Dr Zulkarnain Zainal; Room: 420, telephone: (038946)6810; email: [zulkar@fsas.upm.edu.my](mailto:zulkar@fsas.upm.edu.my);
- Dr Tan Wee Tee; Room: Level 2, .

### **Course prerequisite**

Pass STPM chemistry or Matriculation chemistry or equivalent. Student without the prerequisite are not allowed to take this course.

## Course Objectives

At the end of this course the student should:

- obtain basics knowledge of physical and inorganic chemistry as the prerequisite for higher level chemistry courses.
- able to solve problems in physical and inorganic chemistry using basics knowledge of chemistry

## Timetable

- *Lecture*: Tuesday 10 -12 am; Wednesday 10.00 am; Place: BKP 01/02.
- *Practical*:
  - Monday (2.00 - 4.00 pm) Lab 3 and 4 Old Building
  - Wednesday (2.00 – 4.00 pm) 438, 440 Level 4
- *Lab Assistant*: Pn Zabedah and Pn Noriza
- *Tutorial*: Tutorial will be slotted in between practical class. Timetable for practical and tutorial will be given later.

## **Attendance**

Attendance for all course activities (lecture, practical and tutorial classes) are compulsory and will be recorded. Student not attending these activities for more than 20% may not be allowed to sit for the final exam. Students not attending practical class without medical certificate from UPM's Health Centre will be given 0 marks for the particular practical. Repeat student can be exempted from the practical class if their previous marks for practical exceed certain limit set by the coordinator. Repeat student are required to discuss this matter with the coordinator.

## **Registration for Practical and Briefing**

Registration for practical and briefing session will be conducted on Wednesday (1.12.04) 2.00 pm at chemistry labs. Follow instruction and enter lab 3, 4, 438 or 440. Upon registration student can obtain a copy lab manual. Student who need to buy goggle (RM12) and lab coat (RM40) can do so at the same time and place.

# Course Evaluation

Evaluation will be conducted in form of tests, practical and final exam. Tentatively the marks are divided as follows.

Test 1	20%
Test 2	20%
Practical	20%
Final exam	40%

The first test will be held on week 5 and the second test on week 10. The time and place for the test will be announced later. Practical are evaluated base on the report submitted every week and practical question may also appear in tests. The timetable for the final exam is set by the UPM Academic Section.

## References

- **Brady, J. E. and Senese, F. 2004. Chemistry: Matter and Its Changes. John Wiley & Sons. 4<sup>th</sup> Edition. (Available at UPM Bookshop)**
- **Silberberg, M. S. 2003. Chemistry: The Molecular Nature of Matter and Change. McGrawHill. 3<sup>rd</sup> Edition. (Available at UPM Bookshop)**
- **Brady, J.E. Russel, J.W and Holum J.R. (2000). Chemistry:, Matter and Its Changes. John Wiley & Sons. 3rd Edition.**
- **Moore, J. W., Stanitski, C. L. and Jurs, P. C. (2005) Chemistry: The molecular Science. Thomson Brooks Cole. 2<sup>nd</sup>. Edition.**
- Butler, I. S. and Harrod, J. F. 1989. *Inorganic Chemistry: Principles and Applications*. New York: The Benjamin/Cummings Publishing Co.
- Cotton F. A., Wilkinson, L. G. and Gaus, P. L. 1995. *Basic Inorganic Chemistry*. 3rd ed., New York: John Wiley.
- Ebbing, D. D. and Wrighton, M. S. 1990. *General Chemistry*. 2nd ed. Boston: Houghton Mifflin Company.
- Kask, U. and Rawn, J. D. 1993. *General Chemistry*. Dubuque: Wm. C. Brown Publishers.
- Miessler, G. L. and Tarr, D. A. 1991. *Inorganic Chemistry*. New York: Prentice Hall.
- Petrucci, R. H. and Harwood, W. S. 1993. *General Chemistry: Principles and Modern Application*. 6th ed. New York: Macmillan.

## Website

Students are encouraged to visit the following website for online lecture notes, circulars, tutorial questions and other related materials.

<http://www.fsas.upm.edu.my/~kimia/>

Find the link for online course and CHM3010

## Kandungan Kursus

1. Teori kuantum ringkas (ZZ)  
Asas eksperimen teori kuantum, struktur elektronik, konsep-konsep orbital, gambaran geometri awan elektron, prinsip ketidakpastian, teori kebarangkalian, nombor kuantum, prinsip Aufbau, prinsip Pauli, konfigurasi elektron.
2. Jadual berkala dan sifat berkala (TWT)  
Jadual berkala (secara ringkas), keupayaan pengionan dan faktor yang menentukan. Cas nukleus berkesan, jejari atom dan ion, kesan penabiran dan nilainya. Persamaan Born, tenaga afiniti dan kaedah pengiraannya dari kitaran Born-Haber. Keelektronegatifan: kaedah Pauling, Mulliken dan Sanderson. Prinsip penyamaan keelektronegatifan dan pengiraan cas separa.
3. Teori pengikatan (TWT)  
Ikatan elektrovalen, ikatan kovalen, penghibridan orbital dan bentuk molekul, ikatan hidrogen, ikatan Van der Waals, ikatan logam dan kekonduksian logam, teori ikatan valens, teori orbital molekul, pengikatan dalam kompleks logam peralihan.
4. Kimia kumpulan utama (TWT)  
Pengikatan, sebatian ddua dan garam terbentuk termasuk halida. Kimia sebatian tersebut. Kimia unsur dan kimia berair.
5. Sifat-sifat gas, cecair dan pepejal (ZZ)  
Gas: Hukum gas. Cecair: sifat fizik cecair. Pepejal: jenis pepejal, sifat pepejal, padatan rapat.

6. Keseimbangan (ZZ)  
Keseimbangan kimia: Tindak balas berbalik, keseimbangan homogen, keseimbangan heterogen, pemalar keseimbangan, kesan kepekatan, suhu dan tekanan ke atas keseimbangan. Keseimbangan ion: Teori asid bes, konsep Arrhenius, Bronsted Lowry dan Lewis, kekuatan asid, pemalar penceraian, pemalar ion air, skala pH, larutan penimbal. Konsep asid-bes keras dan lembut.
7. Elektrokimia (ZZ)  
Kekonduksian elektrolit, Hukum Faraday, keupayaan elektrod piawai, perubahan tenaga bebas, tindak balas redoks. Sel-sel kimia dan persamaan Nernst. Penggunaan elektrokimia dalam proses pada keseimbangan. Pentitratan redoks.
8. Kinetik tindak balas (ZZ)  
Kadar tindak balas, persamaan kadar, tertib tindak balas, mekanisme tindak balas, penentuan tertib tindak balas. Teori perlanggaran molekul. Teori kompleks peralihan.
9. Termodinamik (ZZ)  
Termokimia: haba tindak balas dan Hukum Hess. Termodinamik pengenalan: Tenaga, kerja, haba, entropi dan tenaga bebas. Keseimbangan dan kespontanan tindak balas.
10. Kimia Nukleus (ZZ)  
Struktur nukleus, isotop dan siri radioaktif. Ciri tindak balas nukleus. Kinetik pereputan. Pengesanan bahan radioaktif.

1 29-4 Dec	<b>TAKLIMAT KURSUS</b> <i>Penyelaras</i>	Teori Kuantum ringkas <i>Dr Zulkarnain</i>	Teori Kuantum ringkas <i>Dr Zulkarnain</i>
2 6-11 Dec	Teori Kuantum ringkas <i>Dr Zulkarnain</i>	Teori Kuantum ringkas <i>Dr Zulkarnain</i>	Teori Kuantum ringkas <i>Dr Zulkarnain</i>
3 13-18 Dec	Jadual Berkala dan Sifat Berkala <i>Dr Tan Wee Tee</i>	Jadual Berkala dan Sifat Berkala <i>Dr Tan Wee Tee</i>	Jadual Berkala dan Sifat Berkala <i>Dr Tan Wee Tee</i>
4 20-25 Dec	Teori Pengikatan <i>Dr Tan Wee Tee</i>	Teori Pengikatan <i>Dr Tan Wee Tee</i>	Teori Pengikatan <i>Dr Tan Wee Tee</i>
5 27-1 Jan	Teori Pengikatan <i>Dr Tan Wee Tee</i>	Teori Pengikatan <i>Dr Tan Wee Tee</i>	<b>UJIAN 1</b>
6 3-8 Jan	Kimia Kumpulan Utama <i>Dr Tan Wee Tee</i>	Kimia Kumpulan Utama <i>Dr Tan Wee Tee</i>	Kimia Kumpulan Utama <i>Dr Tan Wee Tee</i>
7 10-15 Jan	Kimia Kumpulan Utama <i>Dr Tan Wee Tee</i>	Keseimbangan <i>Dr Zulkarnain</i>	Keseimbangan <i>Dr Zulkarnain</i>
17-23 Jan	<b>CUTI PERTENGAHAN SEMESTER</b>		

8 24-29 Jan	Keseimbangan <i>Dr Zulkarnain</i>	Keseimbangan <i>Dr Zulkarnain</i>	Keseimbangan <i>Dr Zulkarnain</i>
9 31-5 Feb	Keseimbangan <i>Dr Zulkarnain</i>	Termodinamik <i>Dr Zulkarnain</i>	Termodinamik <i>Dr Zulkarnain</i>
7-13 Feb	CUTI(TAHUN BARU CINA DAN MAAL HIJRAH)		
10 14-19 Feb	Termodinamik <i>Dr Zulkarnain</i>	Termodinamik <i>Dr Zulkarnain</i>	UJIAN 2
11 21-26 Feb	Kinetik Kimia <i>Dr Zulkarnain</i>	Kinetik Kimia <i>Dr Zulkarnain</i>	Kinetik Kimia <i>Dr Zulkarnain</i>
12 28-5 Mac	Kimia Nukleus <i>Dr Zulkarnain</i>	Kimia Nukleus <i>Dr Zulkarnain</i>	Kimia Nukleus <i>Dr Zulkarnain</i>
13 7-12 Mac	Elektrokimia <i>Dr Zulkarnain</i>	Elektrokimia <i>Dr Zulkarnain</i>	Elektrokimia <i>Dr Zulkarnain</i>
14 14-19 Mac	Gas, cecair, pepejal <i>Dr Zulkarnain</i>	Gas, cecair, pepejal <i>Dr Zulkarnain</i>	Gas, cecair, pepejal <i>Dr Zulkarnain</i>
PEPERIKSAAN AKHIR ADK BAHAGIAN AKADEMIK			