

新东方SAT考试辅导教材

# CHEMISTRY

# SAT<sup>\*</sup> II

# 化学



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- 倾囊相授解题技巧，直击正确答案
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新东方SAT考试辅导教材

CHEMISTRY  
SAT\* II  
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# SAT 考试概述

## 一、考试认可

SAT 考试(Scholastic Assessment Test)是由美国大学委员会(College Board)组织的“学术水平测验考试”，是美国高中生进入美国大学的标准入学考试。SAT 考试成绩是美国大学唯一能够得到的、可以比较来自不同地区和学校学生的成绩，所以对录取与否及奖学金多少的影响非常大。美国 3600 余所大学都接受 SAT 考试成绩。

## 二、考试简介

SAT 考试分为两部分：

**1. SAT I (SAT Reasoning Test)：**包括数学、阅读、写作 3 个部分，考试时间为 3 小时 45 分钟，各部分的测试内容、测试题型和分值如下：

数学部分：	测试内容	测试题型	分值
	运算能力、代数与函数、几何、数据分析、统计学及基础概率论	选择题、应用题	800
阅读部分：	测试内容	测试题型	分值
	批判性阅读与句子理解	阅读理解、句子填空	800
写作部分：	测试内容	测试题型	分值
	语法、词汇、语言应用	写作、语法	800

**2. SAT II(SAT Subject Tests)：**包括数学、物理、化学、生物、文学、美国历史、世界历史、外语(汉语、日语、德语、法语、西班牙语、拉丁语等 20 种)。部分美国名校只要求中国留学申请人提供 SAT I 的成绩，部分院校及专业要求申请人提供 SAT II 的单科考试成绩。

SAT II 考试时间为 1 小时，大部分为选择题，每科满分为 800 分，主要考查考生某一学科的知识和运用这些知识的能力。

## 三、考试报名

决定报名前，首先要有一张国际通用信用卡，如果没有，需要办理一张中国银行的“长城国际信用卡”。具体报名程序如下：

1. 登录 [www.collegeboard.com](http://www.collegeboard.com) 注册个人信息，从而获得用户名和密码；
2. 登录 SAT 首页，进入自己的账户。填写个人在校成绩、期望申请的专业等信息；
3. 上述信息填写完毕后，第二次登录时，这些信息不会出现，此时直接点击“new registration”进入即可。在注册第一页选择考试类型、考点、年级(美国的 12 年级等于中国的高中三年级)等；
4. 点“continue”进入下一页面，选择考试时间；
5. 进入下一页面，选择是否接受“student answer service”的服务(如果选“yes”，要交额外的费用，但考试后可获得考试报告)；
6. 进入下一页面，填写欲申请的学校(也可以不填)；
7. 进入下一页面，选择考试地点(如选择香港，点“search”，会出现几个地点，可选择其中之一；点“add”，再选择)；
8. 进入下一页面，此时会出现“registration information”、“fee and payment”和“credit card information”。填写信用卡类型、卡号及有效期，之后会得到确认单，报名即完成。

## 四、什么是 PSAT?

PSAT (Preliminary SAT) 是 SAT 的预备测验, 这个测验的分数可以用来申请 NMSQT (National Merit Scholarship Qualifying Test, 美国的模范学生奖学金资格测验)。对于广大中国考生而言, PSAT 难度要低于 SAT, 但是考试科目基本一致, 都是阅读、写作、数学, 考生可以通过 PSAT 的培训来逐步适应 SAT 的考试。可以说, PSAT 是 SAT 的预演与准备, PSAT 与 SAT 相结合的培训能够更有效地帮助中国考生打好基础、适应考试, 更有利于考生在 SAT 考试中考出好成绩。

## 五、计分方式

1. SAT 每一类型考题都是由易而难排列。
2. 除 SAT I 部分数学题目外, SAT II 和 SAT I 其他所有题目答错皆倒扣分, 但未作答的题目则以零分计算。
3. 作答时可利用题目的空白处计算或做记号, 但所有答案均需填写在答题纸上才计分。答题纸要小心填写, 如有污损应擦拭干净。
4. SAT I 阅读、数学及写作各部分的分值均为 800 分, SAT II 每科分值也是 800 分。

## 六、成绩查询

考试后两周, 考生可通过网站 [www.collegeboard.com](http://www.collegeboard.com) 查询考试成绩。

## 七、考试建议

### 1. 准许带进考场的物品:

- (1) 护照及准考证
- (2) 2 支 2B 铅笔和橡皮擦  
注意: 不要使用自动铅笔、钢笔或圆珠笔。自动铅笔涂黑的效果不如 2B 铅笔, 使用钢笔或圆珠笔答题则会得 0 分。
- (3) 计算器(用于数学部分)
- (4) 手表(不带语音报时功能)
- (5) 手袋或背包(必须放在座位下方)
- (6) 一些食品和饮料(必须放在所带的手袋和背包里, 考试休息间隙时可以食用)

### 2. 不准带进考场的物品:

- (1) 草稿纸
- (2) 字典、书和笔记本
- (3) 圆规和各种尺子
- (4) 荧光笔和彩色铅笔
- (5) 随身听和便携式 CD 播放器
- (6) 相机
- (7) 带有语音报时功能的手表
- (8) 手机以及除计算器外的其他电子设备

### 3. 备考建议

SAT 考查考生经过长期学习所获得的能力, 准备考试有短期和长期两种准备:

#### A. 短期准备:

- (1) 熟悉题目结构、题型、考试要求及考试程序;
- (2) 详读 International SAT Program Registration Bulletin 手册, 了解更多考试及考前和考后的相关事项。

#### B. 长期准备:

一般而言, 短期集中的练习对熟悉考试题型和减少考试焦虑颇有帮助, 但长期努力才是准备考试的不二法门。考生应多选修较富挑战性的学术性课程, 广泛研读学术性及课外书籍。

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# **PART I**

## **INTRODUCTION TO THE SAT II: CHEMISTRY TEST**



# All About the SAT II: Chemistry Test

## THE SAT II: SUBJECT TESTS

### What Are the SAT II: Subject Tests?

The SAT II: Subject Tests (formerly called the Achievement Tests) are a series of college entrance tests that cover specific academic subject areas. Like the better-known SAT I test, which measures general verbal and math skills, the SAT II tests are given by the College Entrance Examination Board. Colleges and universities often require applicants to take one or more SAT II tests along with the SAT I.

SAT II tests are generally not as difficult as Advanced Placement tests, but they may cover more than is taught in basic high school courses. Students usually take an SAT II test after completing an Advanced Placement course or an Honors course in the subject area.

### How Do I Know if I Need to Take SAT II Tests?

Review the admissions requirements of the colleges to which you plan to apply. Each college will have its own requirements. Many colleges require that you take a minimum number of SAT II tests—usually one or two. Some require that you take SAT II tests in specific subjects. Some may not require SAT II scores at all.

### When Are SAT II Tests Given, and How Do I Register for Them?

SAT II tests are usually given on six weekend dates spread throughout the academic year. These dates are usually the same ones on which the SAT I is given. To find out the test dates, visit the College Board Web site at [www.collegeboard.com](http://www.collegeboard.com). You can also register for a test at the Web site. Click on the tabs marked “students” and follow the directions you are given. You will need to use a credit card if you register online. As an alternative, you can register for SAT II tests by mail using the registration form in the SAT Registration Bulletin, which should be available from your high school guidance counselor.

### How Many SAT II Tests Should I Take?

You can take as many SAT II tests as you wish. According to the College Board, more than one-half of all SAT II takers take three tests, and about one-quarter take four or more tests. Keep in mind, though, that you can take only three tests on a single day. If you want to take more than three tests, you'll need to take the others on a different testing date. When deciding how many SAT II tests to take, base your decision on the requirements of the colleges to which you plan to apply. It is probably not a good idea to take many more SAT II tests than you need. You will probably do better by focusing only on the ones that your preferred colleges require.

### Which SAT II Tests Should I Take?

If a college to which you are applying requires one or more specific SAT II tests, then of course you must take those particular tests. If the college simply requires that you take a minimum number of SAT II tests, then choose the test or tests for which you think you are best prepared and likely to get the best score. If you have taken an Advanced Placement course or an Honors course in a particular subject and done well in that course, then you should probably consider taking an SAT II test in that subject.

### When Should I Take SAT II Tests?

Timing is important. It is a good idea to take an SAT II test as soon as possible after completing a course in the test subject, while the course material is still fresh in your mind. If you plan to take an SAT II test in a subject that you have not studied recently, make sure to leave yourself enough time to review the course material before taking the test.

### What Do I Need on the Day of the Test?

To take an SAT II test, you will need an admission ticket to enter the exam room and acceptable forms of photo identification. You will also need two number 2 pencils. Be sure that the erasers work well at erasing without leaving smudge marks. The tests are scored by machine, and scoring can be inaccurate if there are smudges or other stray marks on the answer sheet.

Any devices that can make noise, such as cell phones or wristwatch alarms, should be turned off during the test. Study aids such as dictionaries and review books, as well as food and beverages, are barred from the test room.

## THE SAT II: CHEMISTRY TEST

### What Is the Format of the SAT II: Chemistry Test?

The SAT II: Chemistry test is a one-hour exam consisting of 85 multiple-choice questions. According to the College Board, the test measures the following knowledge and skills:

- Familiarity with major chemistry concepts and ability to use those concepts to solve problems
- Ability to understand and interpret data from observation and experiments and to draw conclusions based on experiment results
- Knowledge of laboratory procedures and of metric units of measure
- Ability to use simple algebra to solve word problems
- Ability to solve problems involving ratio and direct and inverse proportions, exponents, and scientific notation

The test covers a variety of chemistry topics. The following chart shows the general test subject areas, as well as the approximate portion of the test devoted to each subject.

**SAT II Chemistry Subject Areas**

Subject Area	Approximate Percentage of Exam
1. Structure of Matter	25%
2. States of Matter	15%
3. Reaction Types	14%
4. Stoichiometry	12%
5. Equilibrium and Reaction Rates	7%
6. Thermodynamics	6%
7. Descriptive Chemistry	13%
8. Laboratory	8%

When you take the SAT II: Chemistry test, you will be given a test booklet that includes a periodic table of the elements. The table will show only the element symbols, atomic numbers, and atomic masses. It will not show electron configurations or oxidation numbers. You may not use your own reference tables or a calculator.

**What School Background Do I Need for the SAT II: Chemistry Test?**

The College Board recommends that you have at least the following experience before taking the SAT II: Chemistry test:

- One-year chemistry course at the college preparatory level
- One-year algebra course
- Experience in the chemistry laboratory

**How Is the SAT II: Chemistry Test Scored?**

On the SAT II: Chemistry test, your “raw score” is calculated as follows: You receive one point for each question you answer correctly, but you lose one-quarter point for each question you answer incorrectly. You do not gain or lose any points for questions that you do not answer at all. Your raw score is then converted into a scaled score by a statistical method that takes into account how well you did compared to others who took the same test. Scaled scores range from 200 to 800 points. Your scaled score will be reported to you, to your high school, and to the colleges and universities that you designate to receive it.

Scoring scales differ slightly from one version of the test to the next. The scoring scales provided after each practice test in this book are only samples that will show you your approximate scaled score.

### When Will I Receive My Score?

Scores are mailed to students approximately three to four weeks after the test. If you want to find out your score a week or so earlier, you can do so for free by accessing the College Board Web site or for \$10 by calling 800-SAT-SCORE.

### How Do I Submit My Score to Colleges and Universities?

When you register to take the SAT I or SAT II tests, your fee includes free reporting of your scores to up to four colleges and universities. To have your scores reported to additional schools, visit the College Board Web site or call 800-SAT-SCORE. You will need to pay an additional fee.

## SAT II: CHEMISTRY QUESTION TYPES

The SAT II: Chemistry test consists entirely of multiple-choice questions. Most are the regular five-answer-choice format that you will be familiar with from taking other standardized tests. Some, however, have special formats that do not appear on other tests and that you need to be aware of. The College Board calls these formats “classification sets” and “relationship analysis questions.” Review the following examples before you tackle the Diagnostic Test.

### *Regular Multiple-Choice Questions*

On the SAT II: Chemistry test, most of the questions are in the regular five-answer-choice format that is used on standardized tests such as the SAT I. Here is an example:

1. Which oxidation half reaction below demonstrates conservation of mass and charge?
- (A)  $\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg}$
  - (B)  $\text{Cl}^- + 1\text{e}^- \rightarrow \text{Cl}_2$
  - (C)  $2\text{Ag}^{1+} \rightarrow 2\text{Ag} + 1\text{e}^-$
  - (D)  $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$
  - (E)  $\text{F}_2 + 2\text{e}^- \rightarrow 2\text{F}^{1-}$

The correct answer is choice D. Note that with this question, as with many other questions on the test, you can find the correct answer by using the process of elimination. The half reactions shown in choices A, B, and E are all reduction half reactions, so those choices can be eliminated. Both remaining choices, C and D, show oxidation and a loss of electrons. But choice C does not demonstrate conservation of charge and mass; if it did, there would have to be two electrons on the left side of the reaction. So the correct answer must be choice D.

You will see a variation of this basic format in which you are offered three choices indicated by the Roman numerals I, II, and III. Your task is to decide which combination of the three choices answers the question. Here is an example:

2. Which of the following indicates an acidic solution?
- I. Litmus paper turns blue.
  - II. Phenolphthalein turns pink.
  - III. Hydronium ion concentration is greater than hydroxide ion concentration.
- (A) I only
  - (B) II only
  - (C) III only
  - (D) I and II only
  - (E) I, II, and III

The correct answer is choice C. First, review the choices. Choices I and II indicate a basic solution. If they were acidic, then the solutions would be red for litmus and clear for phenolphthalein. Only choice III holds true for an acidic solution. In an acidic solution the concentration of hydronium ions exceeds that of hydroxide ion concentration.

### ***Classification Sets***

In a classification set, you are given five answer choices lettered A through E. The choices may be chemistry principles, substances, numbers, equations, diagrams, or the like. The choices are followed by three or four numbered questions. Your task is to match each question with the answer choice to which it refers. Here are sample directions for a classification set, followed by a sample of this question format.

**Directions:** Each of the following sets of lettered choices refers to the numbered formulas or statements immediately below it. For each numbered item, choose the one lettered choice that fits it best. Then fill in the corresponding oval on the answer sheet. Each choice in a set may be used once, more than once, or not at all.

Question 3–5:

- (A) Coordinate covalent bonding
  - (B) Ionic bonding
  - (C) Nonpolar covalent bonding
  - (D) Metallic bonding
  - (E) Hydrogen bonding
3. HF
4. N<sub>2</sub>
5. KI

3. The correct answer is choice E. The bond between the atoms of hydrogen and fluorine is a polar covalent bond, a choice that is not present in the choices above. Now look at the bonding between the molecules of HF. HF can exhibit dipole forces between its molecules, yet another choice that is not present. HF can, however, exhibit hydrogen bonding, a choice that is present.

4. The correct answer is choice C. Nitrogen gas has no difference in electronegativity between the nitrogen atoms. The two nitrogen atoms will form a nonpolar covalent bond. The type of bonding present between the molecules of nitrogen gas will be dispersion forces, the forces present between nonpolar molecules.

5. The correct answer is choice B. Potassium iodide is formed from a metal, potassium, and a nonmetal, iodine. The type of bonding that forms between metals and nonmetals is ionic bonding.

### Relationship Analysis Questions

Relationship analysis questions are probably not like any question type that you have seen before. Each question consists of two statements labeled I and II with the word BECAUSE between the two statements. For each question, you have three tasks. You must:

- Determine if statement I is true or false.
- Determine if statement II is true or false.
- Determine if statement II is the correct explanation for statement I.

On the answer sheet, you will mark true (T) or false (F) for each statement, and you will mark “correct explanation” (CE) ONLY if statement II is a correct explanation of statement I. Here are sample directions for this kind of question, followed by two examples and a sample of a correctly marked answer sheet.

**Directions:** Each question below consists of two statements. For each question, determine whether statement I in the leftmost column is true or false and whether statement II in the rightmost column is true or false. Fill in the corresponding T or F ovals on the answer sheet provided. Fill in the oval labeled “CE” only if statement II correctly explains statement I.

101 HCl is an Arrhenius acid	BECAUSE	HCl is a proton donor.
102 Water is a polar molecule	BECAUSE	the dipole forces in a molecule of water will counterbalance each other and cancel out.

101. T, T, CE HCl will donate a proton (hydronium ion) when it reacts. This classifies it as an Arrhenius acid.
102. T, F Because of the bent shape of a water molecule, the dipole forces in the molecule will not counterbalance or cancel out. This is what causes a water molecule to be a polar molecule.

Here is how you would mark these answers on the answer sheet:

	I	II	CE*
101	<input checked="" type="radio"/> <input type="radio"/> F	<input checked="" type="radio"/> <input type="radio"/> F	<input checked="" type="radio"/>
102	<input checked="" type="radio"/> <input type="radio"/> F	<input type="radio"/> T <input checked="" type="radio"/>	<input type="radio"/>



## How to Use This Book

The SAT II: Chemistry test covers a very large amount of material, and your preparation time may be short. That is why it is important to use your study time wisely. This book provides a comprehensive review of everything you need to know for the test, and it has been organized to make your study program practical and efficient. It will help you:

- Identify the chemistry topics that you most need to focus on.
- Familiarize yourself with the test format and test question types.
- Review all the basic chemistry you need to know for the test.
- Check your progress with questions at the end of each review chapter.
- Practice your test-taking skills using sample SAT IIs.

The following four-step study program has been designed to help you make the best use of this book.

### STEP 1

#### TAKE THE DIAGNOSTIC TEST

Once you have read through this chapter, start your preparation program by taking the Diagnostic Test. This test is carefully modeled on the real SAT II: Chemistry test in terms of format, types of questions, and topics tested. Take the Diagnostic Test under test conditions and pay careful attention to the one-hour time limit. When you complete the test, score yourself using the scoring information at the end of the test. Then read through the explanations to see which test topics gave you the most trouble. Look for patterns. Did you miss questions in one or two specific subject areas? Did specific question formats give you trouble? When did you need to guess at the answer? Use your results to identify the topics and question types that were most difficult for you. Once you know your chemistry strengths and weaknesses, you'll know which subjects you need to focus on as you review for the test.

### STEP 2

#### REVIEW THE TEST TOPICS

This book provides a full-scale review of all the topics tested on the SAT II: Chemistry test. Once you have identified the topics that give you the most trouble, review the relevant chapters. You do not need to work through the review chapters in the order in which they appear. Skip around if you like, but remember to focus on the topics that gave you the most trouble on the Diagnostic Test.

Each review chapter ends with practice problems that you can use to see how well you have mastered the material. If you get a problem wrong, go back into the chapter and reread the section that covers that particular topic.

Make a study schedule. If you have the time, plan to spend at least two weeks or so working your way through the review chapters. Be sure to set aside enough time at the end of your schedule to take the practice tests at the end of the book. However, if you do not have much time before the test, you may want to shorten your review time and focus instead entirely on the practice tests.