

American Chemical Society

Chemistry: A Key to Human Progress

**Frank C. Whitmore Lecture on Chemistry
Education and Public Policy**

22nd Biennial Conference on Chemical Education

July 29, 2012

State College, PA

Bassam Z. Shakhshiri

President, American Chemical Society

Professor of Chemistry

The William T. Evjue Distinguished Chair for the Wisconsin Idea

University Wisconsin-Madison



4th BCCE Madison 1976



August 8-12

4th

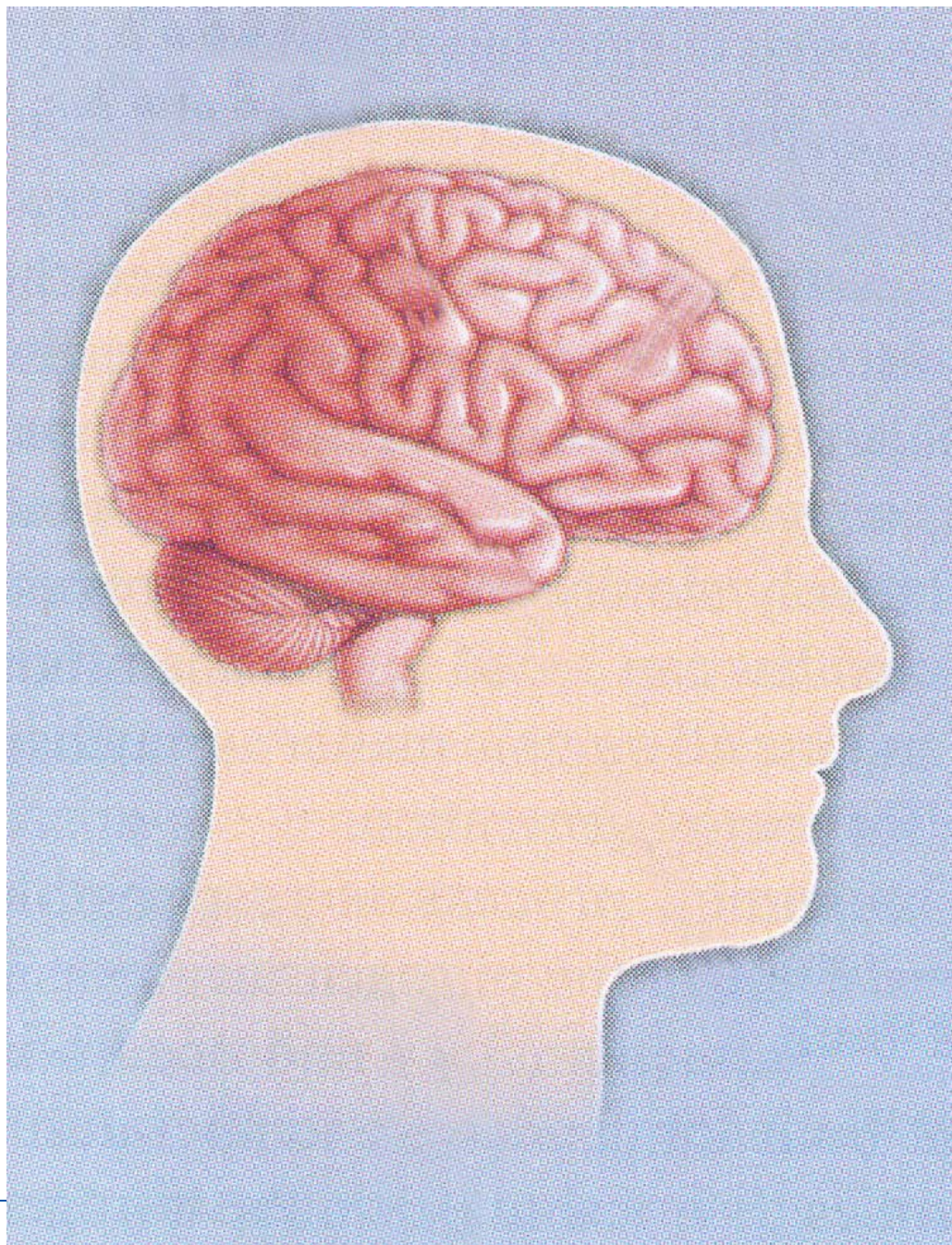
**BIENNIAL CONFERENCE
ON CHEMICAL EDUCATION**

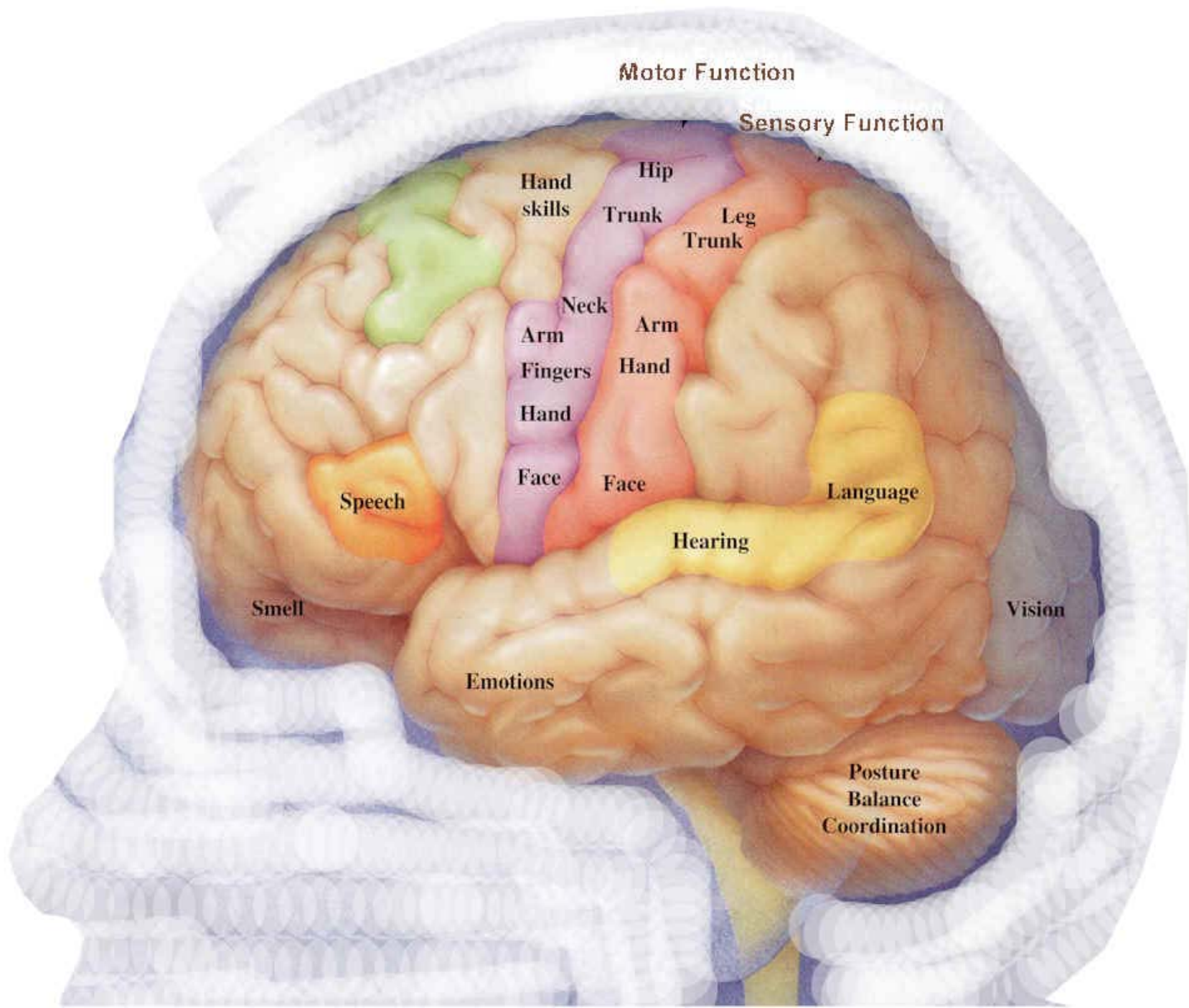
UNIVERSITY OF WISCONSIN-MADISON

**PARTICIPANT-PACED
PROGRAMMING**



ACS
Chemistry for Life®





Respect

Trust

Confidence

ACS MISSION

Advance the broader chemistry enterprise and its practitioners for the benefit of Earth and its people.

ACS VISION

Improving people's lives through the transforming power of chemistry.

www.acs.org

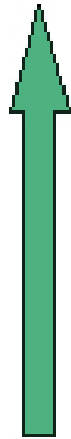
Grand Challenges to Society and to Scientists

Help sustain Earth and its people in the face of:

- Population growth
- Finite resources
- Malnutrition
- Spreading disease
- Deadly violence
- War
- Climate change
- Denial of basic human rights, *especially the right to benefit from scientific and technological progress.*

**SCIENCE AND SOCIETY HAVE
WHAT IS ESSENTIALLY A SOCIAL CONTRACT
THAT ENABLES GREAT INTELLECTUAL ACHIEVEMENTS
BUT COMES WITH MUTUAL EXPECTATIONS
OF BENEFITING THE HUMAN CONDITION
AND PROTECTING OUR PLANET.**

Scientific
Complexity



Bohr "pure basic research"	Pasteur "use-inspired basic research"
	Edison "pure applied research"



Social utility

PASTEUR'S QUADRANT

Basic Science and Technological Innovation

Donald Stokes

Brookings Institution Press, 1997

Industrial Revolution

Industrial Revolution

Electronic Revolution

Science-rich Sector

Science-poor Sector

Scientific Competence

Scientific Expertise

Science Literacy

Science Literacy is for Everyone

Chemists, Artists, Humanists,
All Professionals, The General Public,
Youth and Adults Alike

Advancing Chemistry



Communicating Chemistry

Presidential Initiatives for 2012

- Initiative 1:** ACS and the Sesquicentennial of the Morrill Land Grant Act
- Initiative 2:** ACS Commission to examine purposes of graduate education in the chemical sciences
- Initiative 3:** Helping the public understand the *science* of climate change
- Initiative 4:** Explore High School Teacher Fellowship Program

Advancing Chemistry

Research

Education

Innovation

Communication

Inform
Engage
Educate
Advocate
Persuade

WISL Graduate Student Awards to Promote Communicating Chemistry

- All Ph.D. chemistry candidates are encouraged to include a chapter in their Ph.D. thesis communicating their research to non-specialists.
- Cash awards of \$500 will be given to individuals whose Ph.D. thesis includes such a chapter.
- The goal is to explain the candidate's scholarly research and its significance to a wider audience that includes family members, friends, civic groups, newspaper reporters, state legislators, and members of the U.S. Congress.
- WISL will assist in the public dissemination of these contributions and will seek to increase the number of these awards.

www.scifun.org

CONNECTIVITY

Chemical Demonstrations

A Handbook for Teachers of Chemistry

Volume **5**

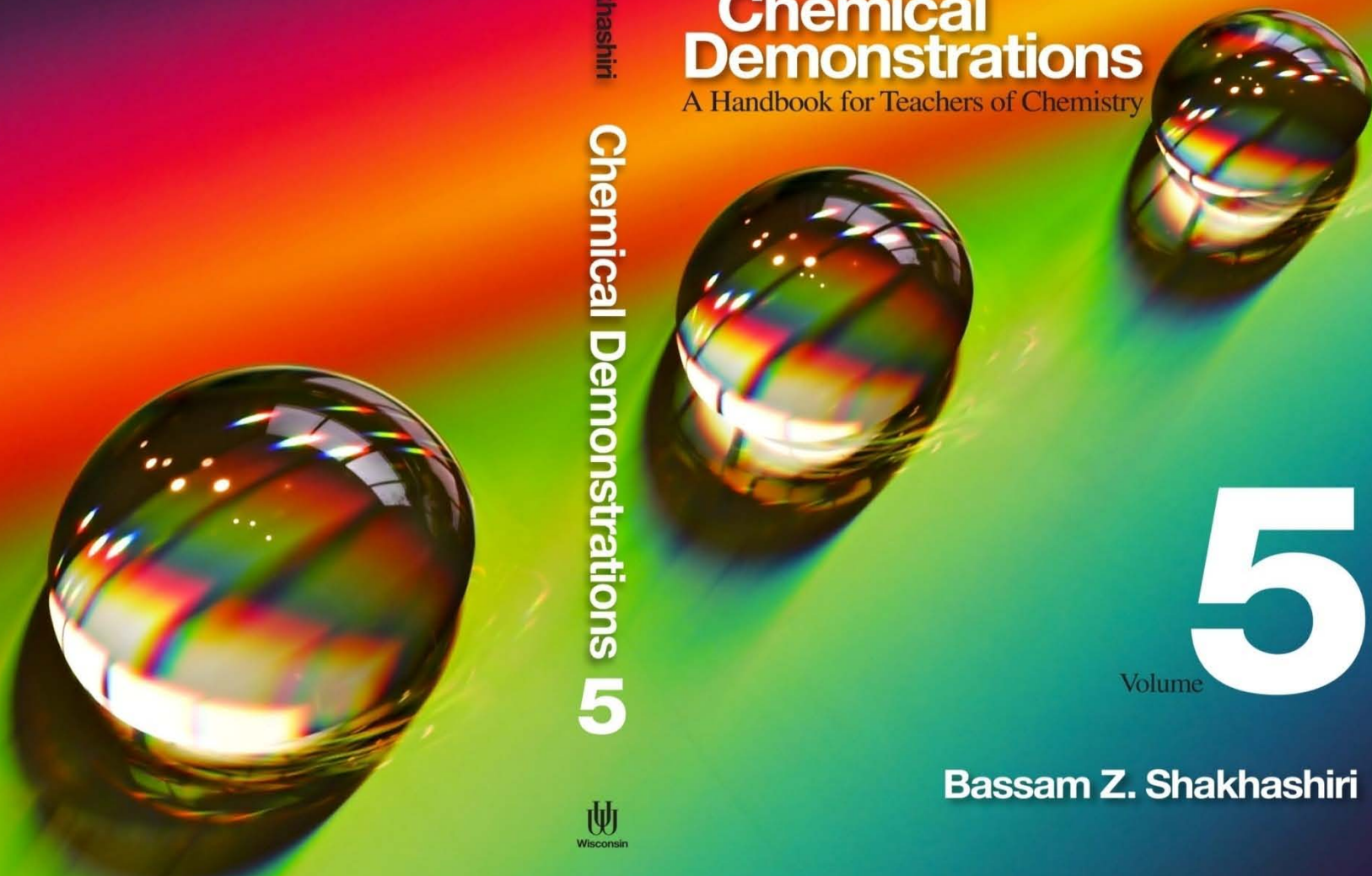
Bassam Z. Shakhshiri

Shakhshiri

Chemical Demonstrations **5**



Wisconsin





Good Teachers Are:

- Competent in their disciplines
- Committed to their disciplines and to the profession of teaching
- Comfortable with the methods and techniques they use
- Compassionate with students (and colleagues)

“Teachers owe it to themselves to teach what they love. In so doing, they nourish their students. They owe it to themselves to show their students who they are. To do this, they need to know what they love, and who they are – not a simple task, but surely the anchor without which they’ll drift.”

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**>> Diane Chapman Walsh
President of Wellesley College**

“Great teachers are the ones who weave webs of life-affirming connection for their students. Proficiency with technology, tightly framed learning outcomes, even multicultural awareness are secondary to the passion teachers bring to their subject matter, the compassion, awe, and joy they embody and communicate. Great teaching comes from spirit, not from technique.”

**>> Diane Chapman Walsh
President of Wellesley College**

“To me, teaching is the ultimate performing art, and all performing arts are interactive. You always have to connect with the people... You don’t just present, you have to connect. And I find it difficult [online]... It’s one thing to give students the illusion that the teacher is really there. What’s much harder is to give the teacher the sense that the students are really there.”



>> Jaron Lanier,

Computer scientist who coined the term “virtual reality”

Problem-Solving Skills

Good Judgment

Humane



ACS
Chemistry for Life®

Humane

Humanitarian

Advancing Chemistry



Communicating Chemistry

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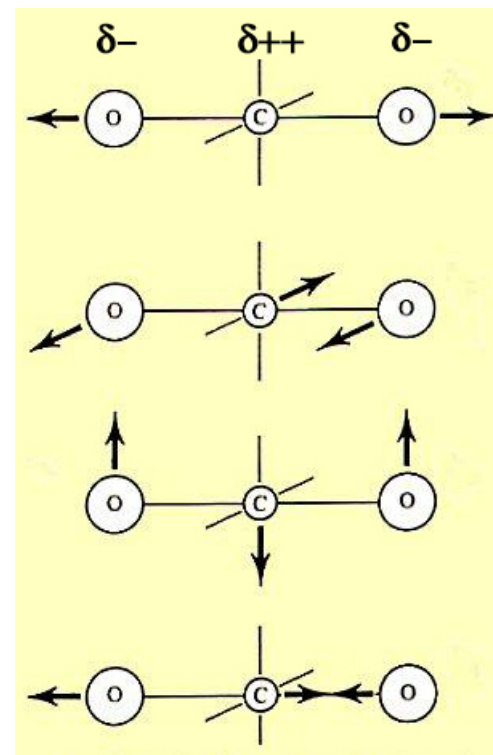
Charge to the Presidential Climate Science Working Group



- **Develop a “Toolkit” on the science of global climate change to enhance the knowledge of ACS members and enable them to discuss climate change with greater confidence.**
- **Articulate strategies for members’ use of the Toolkit in communicating with a variety of audiences, consistent with ACS policy statements. Audiences include educators, civic and religious groups, professional organizations and elected officials at all levels of government.**

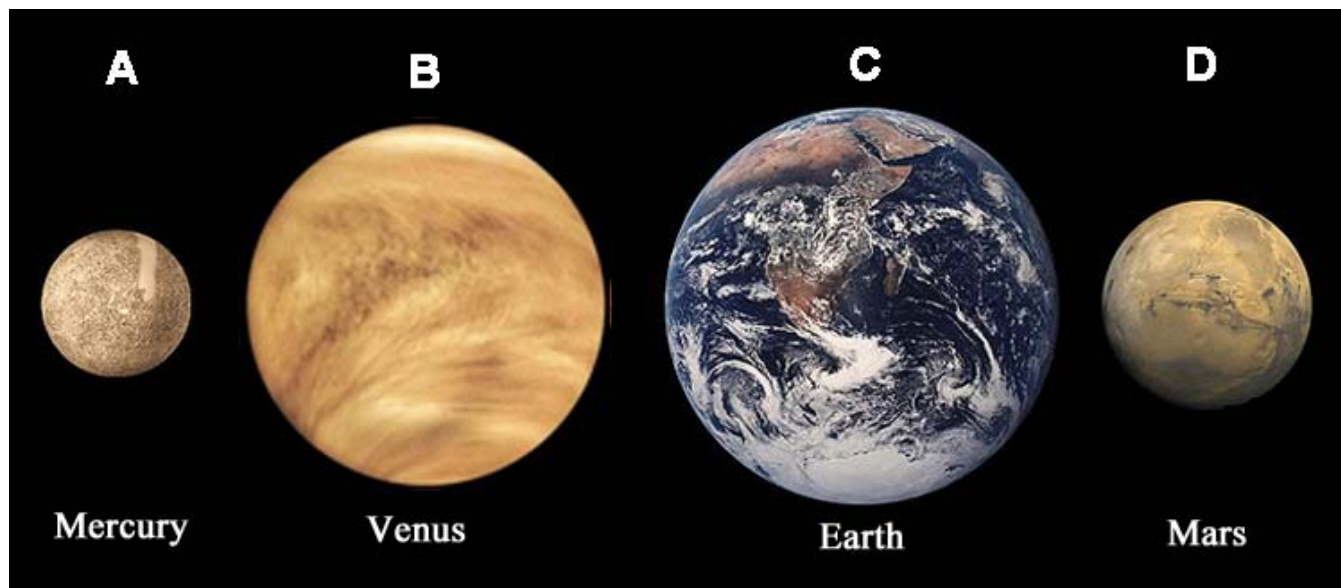
ACS Climate Science Toolkit

- To absorb IR energy, molecular vibrations must change the dipole moment of the molecule.
- All molecules with three or more atoms meet this criterion and are IR absorbers.
- The trace gases in Earth's atmosphere contain many species that absorb IR.



ACS Climate Science Toolkit

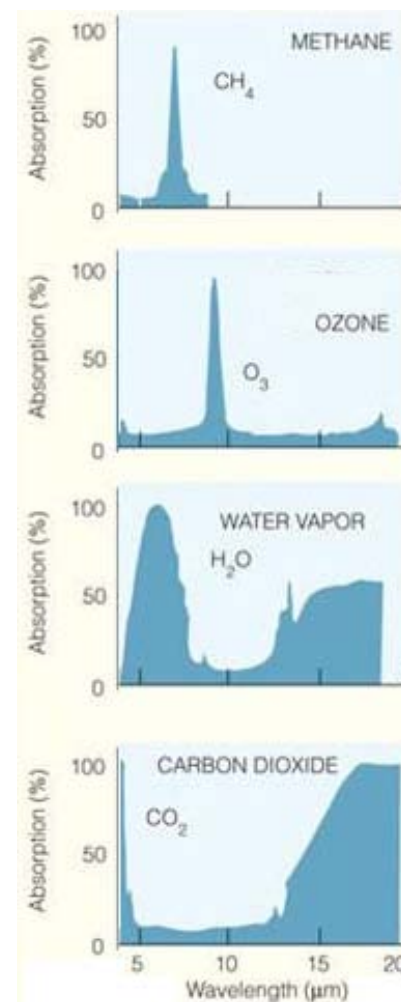
Which of the inner four planets in the solar system has the highest average surface temperature (and **why**)?



ACS Climate Science Toolkit

Which gas is responsible for the largest fraction of the Earth's atmospheric greenhouse warming effect?

- A. methane
- B. ozone
- C. water vapor
- D. carbon dioxide



American Chemical Society



ACS Climate Science Toolkit

Tools to better understand and
communicate climate science



www.acs.org/climatescience

American Chemical Society



Presidential Commission on Graduate Education in the Chemical Sciences

Presidential Commission on Graduate Education in the Chemical Sciences

Charge:

- **What are the purposes of graduate education in the chemical sciences?**
- **What steps should be taken to ensure that graduate education addresses important societal issues as well as the needs and aspirations of graduate students?**

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Scientist-Citizen

SCIENCE IS FUN

www.scifun.org
