School of Pharmacy, Virginia Commonwealth University
Introduction to Pharmaceutical Sciences: From Bench to Shelf MEDC/PCEU 607

Final Exam

Student Name: _____

Dr. Kellogg

1. What physical law is used in molecular mechanics to represent the energy and behavior of covalent (atom-atom) bond? 2.5 pts

2. Why would "Systematic Search" be a poor choice to find the global minimum energy structure of a protein? 2.5 pts

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Student Name: _____

Dr. Rife

1. Briefly (ca. 3 sentences) describe the mechanism of action of antisense oligonucloetides.

2. Briefly (ca. 3 sentences) describe the mechanism of action of the hammerhead ribozyme.

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Student Name: _____

Dr. Karnes

1. Which of the following is required for an FDA regulated bioanalytical laboratory? (2.5 pts)
    a. Procedures for validation of analytical methods.
    b. A quality assurance unit (QAU).
    c. Potency testing of drug formulations.
    d. Regular inspections.

2. Which of the following statements is/are true with regard to homogenous immunoassays? (2.5 pts)
    a. Homogenous immunoassays require a physical separation of bound and free fractions of the labeled antigen.
    b. The label response must not be affected by antibody binding for a homogenous immunoassay to work.
    c. Homogenous immunoassays rely on a change of the label's response that is due to antibody binding.
    d. The label chosen for homogenous immunoassay must enhance the binding affinity of the antibody.

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Student Name: _____

Dr. Desai

1. What is rational drug design? Define in two sentences. 3 pts.

2. Name two important techniques useful in rational drug design. 2 pts.

3. What is combinatorial chemistry? Define in two/three sentences 3 pts.

4. Why is combinatorial chemistry expected to yield more drugs than rational drug design? 2 pts.

5. Draw the scheme of mix and split strategy of combinatorial synthesis using three parallel reaction vessels followed by another set of three reaction vessels. 5 pts.

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Student Name: _____

Dr. Reynolds

1. What does term "duplication" mean in terms of natural product drug discovery and what affect has it had on Industrial interest in pursuing research in this field? (2 points)

2. Natural product libraries can be kept as purified compounds with known chemical structures, or as simple crude organic extracts of plants/microorganisms. Either can be screened for a specific biological activity. Explain which method can provide the greatest potential for finding natural products with potentially interesting activity and why (2 point).

3) Give one example of how "an understanding of the genetic and biochemical basis of natural product production in microorganisms" may be used to access natural products in which the duplication issue is less of a problem (although other issues and problems arise). (1 point).

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Student Name: _____

Dr. Kier

Define in a sentence or two, each of the following terms (2 points each).

1) Technology

2) Science

3) A system

4) The state of a system

5) Observables of a system

Student Name: _____

Dr. Sarkar

Discuss the application of high throughput screening to lead compound identification in drug discovery (5 points).

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Final Exam

Student Name: _____

Dr. Abraham

Circle the letter that best answers (matches) the question (statement).

1. Drug discovery is enhanced by an understanding of which of the following :
   a. synthetic and biophysical organic chemistry.
   b. pharmacology.
   c. the use of computational chemistry and molecular modeling.
   d. the use of x-ray crystallography.
   e. all of the above.
2. *"Paul Ehrlich, the father of modern drug discovery, stated that scientists need the four German G's: Geshicht , Geduld , Geld and Glück)"*. Which of the following does not belong in the list.
   a. skill
   b. luck
   c. money
   d. patience
   e. prudence
3. When tumors are irradiated with therapeutic doses of x-rays, what kills the cancer?
   a. The x-rays
   b. Low temperatures with x-rays
   c. High temperatures with x-rays
   d. Beta radiation
   e. Oxygen radicals
4. Who first suggested that receptors cab be thought of similar to a lock and key concept?
   a. Paul Ehrlich
   b. Linus Pauling
   c. Max Perutz
   d. Herbert C. Brown
   e. Lemont Kier
   f. Don Abraham
5. Hemoglobin is an allosteric protein. Which of the following is not typical of an allosteric protein?
   a. All allosteric states possess symmetry
   b. Thy are multi-subunit proteins
   c. The have a low affinity and high affinity binding state.
   d. They have sigmoidal binding curves
   e. They have hyperbolic binding curves