

Table of Contents

STUDENT EDITION

PREFACE	vii
sciLINKS.....	ix
SECTION 1. UNDERSTANDING TOXIC RISK.....	1
CHAPTER 1. THE DOSE MAKES THE POISON	3
Any Chemical Can Be Toxic	3
Are Natural Chemicals Safer?	4
How Much Is Too Much?	4
Dose/Response Bioassays.....	5
Comparing Chemical Toxicities	6
Long-Term versus Short-Term Toxicity	10
Testing Chronic Toxicity	11
Conclusion	12
For Discussion	12
Toxicity Calculations	13
CHAPTER 2. FROM DATA TO STANDARDS	15
Setting Drinking Water Standards	15
From Data to Standards	19
For Discussion	20
CHAPTER 3. WHAT'S THE RISK?	21
How Safe Is Safe Enough?	22
What Are the Trade-Offs?	23
One Risk versus Another	23
Risk versus Cost	25
For Discussion	26
CHAPTER 4. ECOLOGICAL RISKS.....	27
Effects of Chemical Properties	28
Testing Environmental Impacts of New Compounds.....	30
For Discussion	32
CHAPTER 5. USING BIOASSAYS FOR ENVIRONMENTAL RESEARCH.....	33
Bioassay Species	34
Concentration versus Dose	35
An Introduction to Experimental Design	35
Interpreting Bioassay Results	36
For Discussion	37
References.....	37

SECTION 2. TOXICOLOGY PROTOCOLS:

INTRODUCTION TO RESEARCH	39
TOXICOLOGY PROTOCOLS	41
Protocol 1. Serial Dilutions	41
Protocol 2. Dose/Response Experiments Using Lettuce Seeds	43
Protocol 3. Dose/Response Experiments Using Duckweed	51
Protocol 4. Dose/Response Experiments Using <i>Daphnia</i>	58
Protocol 5. Testing Environmental Samples Using Bioassays	64
Protocol 6. Preparing Water Treatment Columns	66
Protocol 7. Chemical Classification of Toxicants	69
WORKSHEETS FOR PROTOCOLS	75
Protocol Planning Sheet	76
Data Analysis Peer Review Form	78

SECTION 3. BEYOND PROTOCOLS:

CONDUCTING INTERACTIVE RESEARCH	79
IDEAS FOR BIOASSAY RESEARCH	81
Dose/Response Bioassays	81
Bioassays on Environmental Samples	82
Detoxification/Classification Experiments	83
Other Possibilities	84
WORKSHEETS FOR INTERACTIVE RESEARCH	89
Forms for Planning Research	90
Choosing a Research Topic	90
Interactive Research Planning Sheet #1	93
Interactive Research Planning Sheet #2	95
Presenting Research Results	100
Bioassay Research Report Form	100
Poster Design Guidelines	103
Peer Review Forms	104
Experimental Design Peer Review Form	104
Research Report Peer Review Form	105
Poster Peer Review Form	106