

General Knowledge and Skills

Dimensional Analysis

- Determine correct units
- Construct equation to yield correct units
- Calculate solution
- Check answer for reasonability

Common Assays

- ELISA
- Western Blot
- Northern Blot
- Southern Blot
- Immunofluorescence staining
- B-Gal
- Luciferase Assay

Regulatory Requirements

- ISO
- GMP
- GLP
- FDA
- OSHA
- EPA

Future Trends and Concerns

- Increased automation
- Specialized equipment
- Increased regulations
- Society's increased desire for more advanced biotechnology
- Constant exposure to chemicals
- Keeping skills up-to-date to keep up with technology

Skills

- Pipetting
- Microscopy
- Use of DNA synthesizers
- Operation of Centrifuge
- Conversions
- Aseptic technique
- Dilution
- Chemical knowledge
- Measurements
- Accurate and timely maintenance of data
- PCR
- Chromatography
- Titration
- Media preparation
- Use of relevant tools, equipment and supplies

Worker Behaviors

- Detail-oriented
- Ability to work independently
- Patient
- Good communication skills
- Ability to get along with others
- Fast-learner
- Confident
- Flexible
- Ability to multi-task
- Enjoy working in lab environment
- Dependable
- Hard-working
- Good work ethic
- Neat and orderly
- Good organization skills
- Safety-oriented
- Good problem-solving skills

Acronyms

- | | |
|---|---|
| B-Gal - B-Galactosidase | GLP – Good Laboratory Practices |
| DNA - Deoxyribonucleic Acid | GMP – Good Manufacturing Practices |
| ELISA - Enzyme-linked Immunosorbent Assay | HPLC - High Pressure Liquid Chromatograph |
| EPA – Environmental Protection Agency | ISO – International Standards Organization |
| FDA – Food and Drug Administration | MSDS – Material Safety Data Sheet |
| FPLC – Fast Performance Liquid Chromatography | OSHA – Operational Safety and Health Administration |
| | PCR – Polymerase Chain Reaction |

Tools, Equipment, Supplies and Materials

Tools

- Balances
- Confocal microscope
- Electron microscope
- Electronic pipette
- Fluorescent microscope
- Light microscope
- Lot modules
- Microtome
- Multichannel pipette
- Orbital shaker
- pH meters
- Pipetteman
- Repeater pipette
- Rotovap
- Stir/heating plates
- Thermometers
- Vacuum pumps
- Vortexer
- Water baths
- Wire loops

Supplies

- Chemicals
- Dry ice
- Glassware
- Ice bucket
- Lab notebooks
- Lab pens
- Labware
- Liquid nitrogen
- MSDS
- Parafilm
- Personal protective equipment
- Pipette tips
- Racks
- Roller bottles
- Safety supplies
- Wash bottles
- Waste container

Equipment

- Autoclave
- Centrifuge
- Computers
- DNA Sequencer
- DNA Synthesizer
- ELISA film
- documentation system
- Fermentor
- Flow cytometer
- Fluorometer
- FPLC
- Freezers (-80°C, -20°C, liquid nitrogen dewar)
- Fume hood
- Gas Chromatograph
- Glove box
- HPLC
- Incubators
- Laminar flow hood
- Lyophilizer

Equipment (cont'd)

- Plate reader
- Power box
- Printer/scanner
- Refractometer
- Refrigerators (4°C)
- Scintillation counter
- Sonicator
- Spectrophotometer
- Thermocyclers
- Transilluminator
- Water purification system

DACUM Panel

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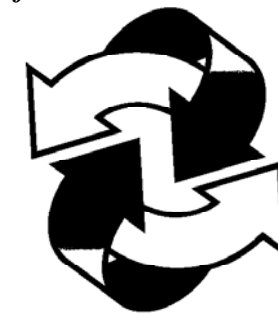
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DACUM Research Chart for Research Assistant (In vitro Biology)

Produced for



CALIFORNIA
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**ECONOMIC &
WORKFORCE
DEVELOPMENT
PROGRAM**

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10440 Black Mountain Road
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Developed by



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DACUM Research Chart for Research Assistant

November 20-21, 2003

Duties		Tasks											
A	Maintain Documentation*	A-1 Establish protocol	A-2 Document equipment calibration	A-3 Record materials	A-4 Record methods	A-5 Record results	A-6 Archive documentation						
B	Prepare Reagent Solution*	B-1 Determine reagent solution	B-2 Procure materials	B-3 Calculate ingredient quantities	B-4 Combine ingredients per protocol	B-5 Adjust pH	B-6 Perform final volume check	B-7 Label reagent solution	B-8 Prepare reagent solution for storage	B-9 Document reagent solution preparation			
C	Construct Clone*	C-1 Choose appropriate vector	C-2 Digest selected vector	C-3 Digest DNA insert	C-4 Perform DNA ligation	C-5 Transform bacteria	C-6 Culture transformed bacteria	C-7 Subculture transformed bacteria	C-8 Purify plasmid	C-9 Digest plasmid	C-10 Perform gel electrophoresis	C-11 Document clone construction	
D	Perform Polymerase Chain Reaction*	D-1 Select DNA primers	D-2 Determine melting temperature of primers	D-3 Gather PCR reagents	D-4 Determine DNA concentration	D-5 Add PCR components to PCR tube	D-6 Run PCR program	D-7 Verify PCR product	D-8 Document reaction				
E	Purify DNA/RNA/Protein Macromolecules	E-1 Obtain biological sample	E-2 Prepare biological sample for purification	E-3 Extract product	E-4 Purify extracted product	E-5 Determine product concentration	E-6 Document purification process						
F	Perform Tissue Culture	F-1 Procure appropriate cell line	F-2 Prepare growth media	F-3 Incubate cells	F-4 Regulate cell density	F-5 Introduce modifying agent	F-6 Incubate modified cells	F-7 Perform characterization assay	F-8 Document tissue culture process				
G	Perform Immunoassay**	G-1 Obtain immunoassay sample	G-2 Determine immunoassay method	G-3 Prepare immunoassay sample	G-4 Conduct immunoassay	G-5 Analyze immunoassay results	G-6 Document immunoassay						
H	Perform Western Blot	H-1 Obtain Western Blot sample	H-2 Prepare Western Blot sample	H-3 Separate prepared proteins on gel	H-4 Transfer protein to membrane	H-5 Block non-specific sites	H-6 Bind primary antibody	H-7 Bind secondary antibody	H-8 Detect presence of antibody	H-9 Document Western Blot			
I	Perform Chromatography	I-1 Establish need for sample separation	I-2 Determine separation method	I-3 Gather relevant materials	I-4 Prepare stationary phase	I-5 Prepare mobile phase	I-6 Prepare sample for separation	I-7 Run chromatography	I-8 Analyze chromatography results	I-9 Document chromatography			
J	Conduct DNA Sequencing	J-1 Prepare acrylamide gel	J-2 Purify target DNA	J-3 PCR DNA for sequencing	J-4 Run acrylamide gel	J-5 Analyze sequencing results	J-6 Document DNA sequencing						

*All Research Assistants will perform these Duties; other Duties may be performed as required, or as determined by industry specialty. All Duties listed are considered common to Research Assistants.

**Reference list of Common Assays under General Knowledge & Skills