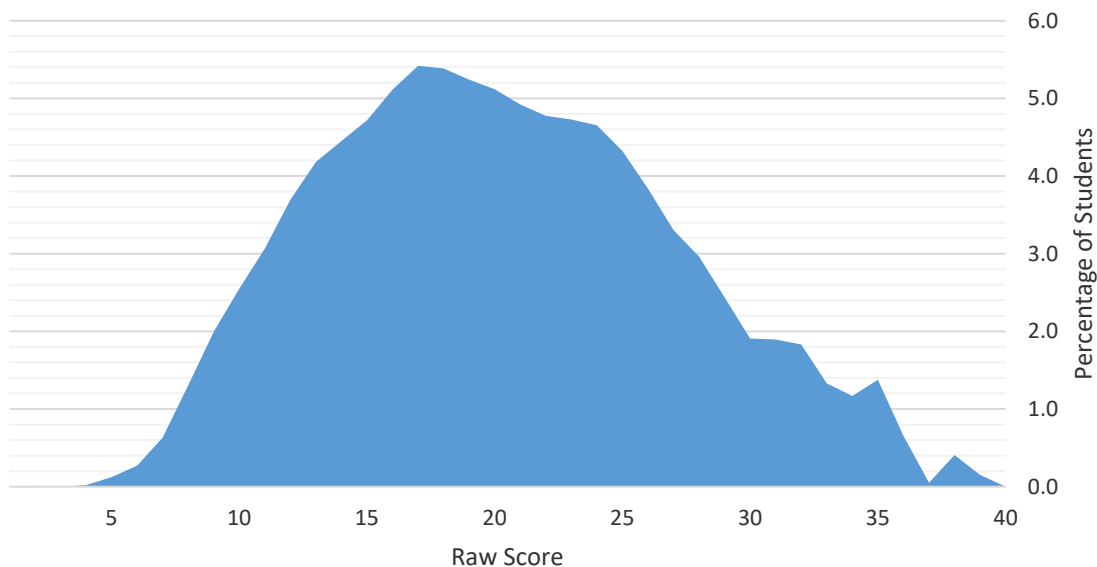


**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Kinetics, Dynamics and Statistical Mechanics**

Score	Percentile	Score	Percentile
40	100	14	18
39	100	13	14
38	99	12	10
37	99	11	7
36	99	10	4
35	97	9	2
34	96	8	1
33	95	7	0
32	93	6	0
31	91	5	0
30	89	4	0
29	87	3	0
28	84	2	0
27	81	1	0
26	77	0	0
25	72		
24	68		
23	63		
22	58		
21	53		
20	48		
19	43		
18	38		
17	32		
16	27		
15	22		

Mean	20.3
Std. deviation	6.9
Median	20
KR-21 reliability	0.81
Std error/meas	3.01

PH14M: Classical Kinetics, Molecular Dynamics and
Statistical Mechanics Norms
based on the scores of 453 students from 24 different institutions

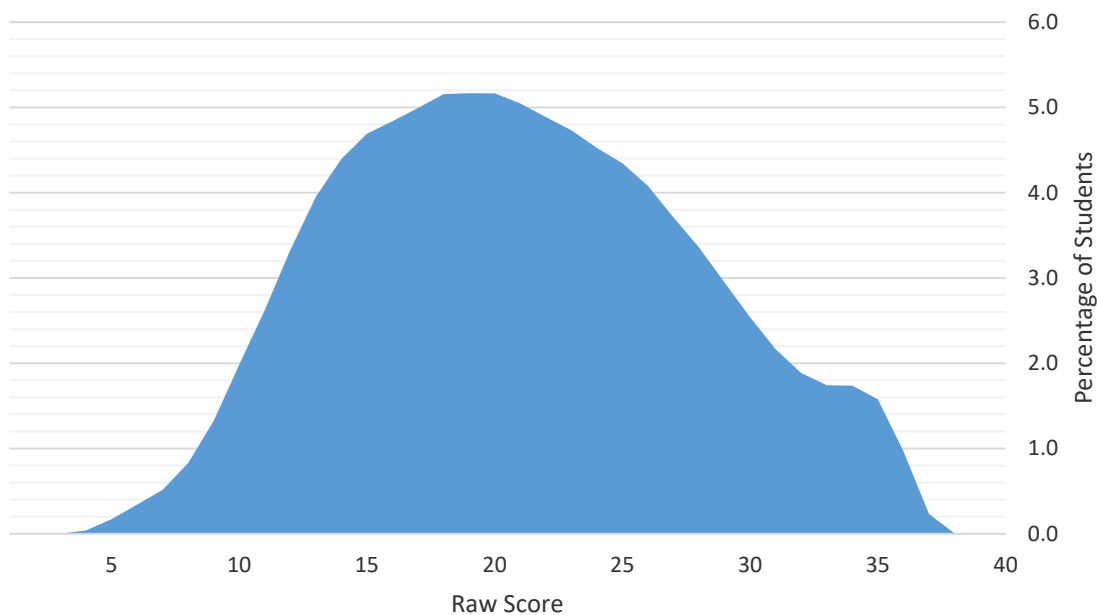


**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Thermodynamics**

Score	Percentile	Score	Percentile
40	100	14	15
39	100	13	11
38	100	12	8
37	100	11	5
36	99	10	3
35	97	9	2
34	95	8	1
33	94	7	1
32	92	6	0
31	90	5	0
30	87	4	0
29	84	3	0
28	81	2	0
27	77	1	0
26	73	0	0
25	69		
24	64		
23	59		
22	55		
21	50		
20	44		
19	39		
18	34		
17	29		
16	24		
15	20		

Mean	21.0
Std. deviation	6.9
Median	21
KR-21 reliability	0.81
Std error/meas	3.00

PH14M: Thermodynamics Norms
based on the scores of 453 students from 24 different institutions

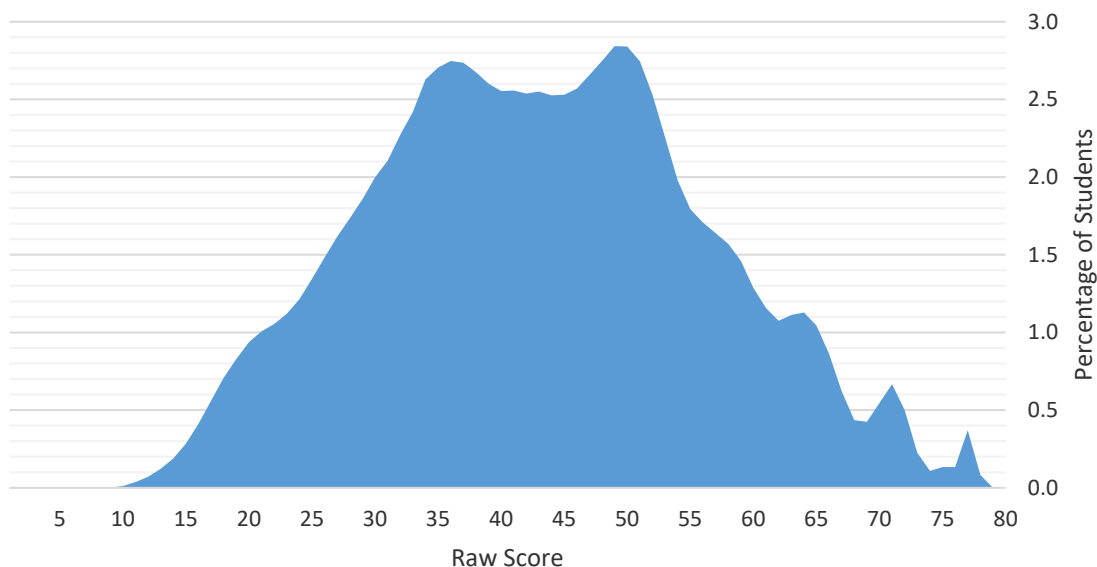


**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Thermodynamics, Kinetics, Dynamics and Statistical Mechanics**

Score	Percentile	Score	Percentile	Score	Percentile	Score	Percentile
80	100	55	80	30	17	5	0
79	100	54	78	29	15	4	0
78	100	53	76	28	13	3	0
77	100	52	73	27	11	2	0
76	99	51	70	26	10	1	0
75	99	50	68	25	9	0	0
74	99	49	65	24	7		
73	99	48	62	23	6		
72	98	47	59	22	5		
71	98	46	57	21	4		
70	97	45	54	20	3		
69	97	44	52	19	2		
68	96	43	49	18	2		
67	96	42	47	17	1		
66	95	41	44	16	1		
65	94	40	41	15	0		
64	93	39	39	14	0		
63	92	38	36	13	0		
62	91	37	33	12	0		
61	89	36	31	11	0		
60	88	35	28	10	0		
59	87	34	25	9	0		
58	85	33	23	8	0		
57	83	32	21	7	0		
56	82	31	19	6	0		

Mean	43.1
Std. deviation	13.3
Median	43
KR-21 reliability	0.90
Std error/meas	4.23
	43.1
	13.3

PH14M: Thermodynamics, Classical Kinetics, Molecular Dynamics and Statistical Mechanics Norms
based on the scores of 453 students from 24 different institutions

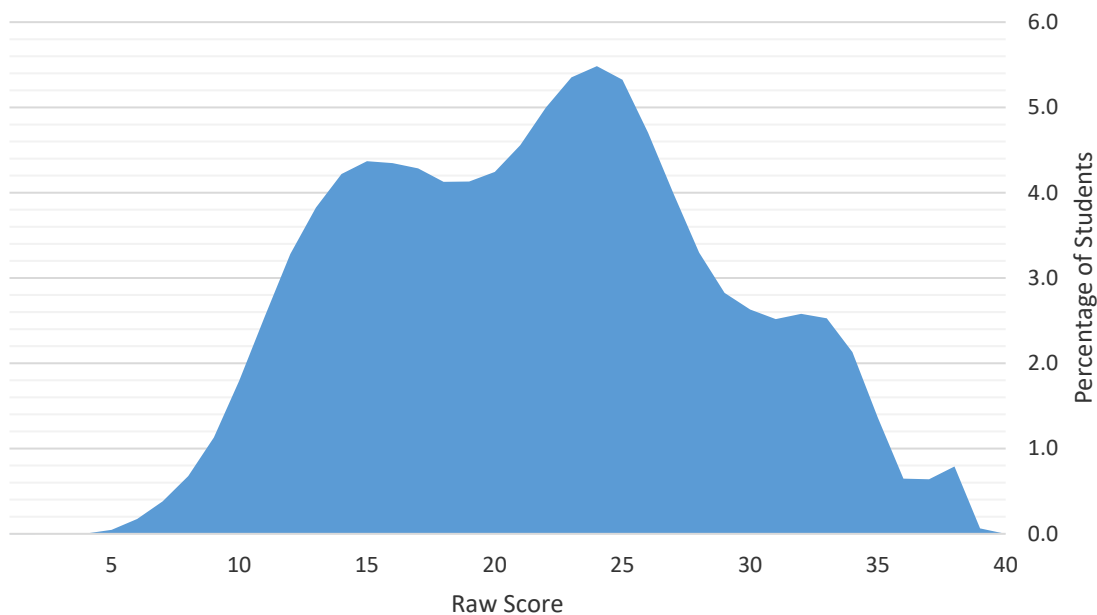


**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Quantum Mechanics**

Score	Percentile	Score	Percentile
40	100	14	14
39	100	13	10
38	99	12	7
37	99	11	4
36	98	10	2
35	97	9	1
34	94	8	1
33	92	7	0
32	89	6	0
31	87	5	0
30	84	4	0
29	81	3	0
28	78	2	0
27	74	1	0
26	69	0	0
25	64		
24	58		
23	53		
22	48		
21	44		
20	39		
19	35		
18	31		
17	27		
16	22		
15	18		

Mean	21.8
Std. deviation	7.1
Median	22
KR-21 reliability	0.82
Std error/meas	2.98

PH14M: Quantum Mechanics Norms
based on the scores of 453 students from 24 different institutions

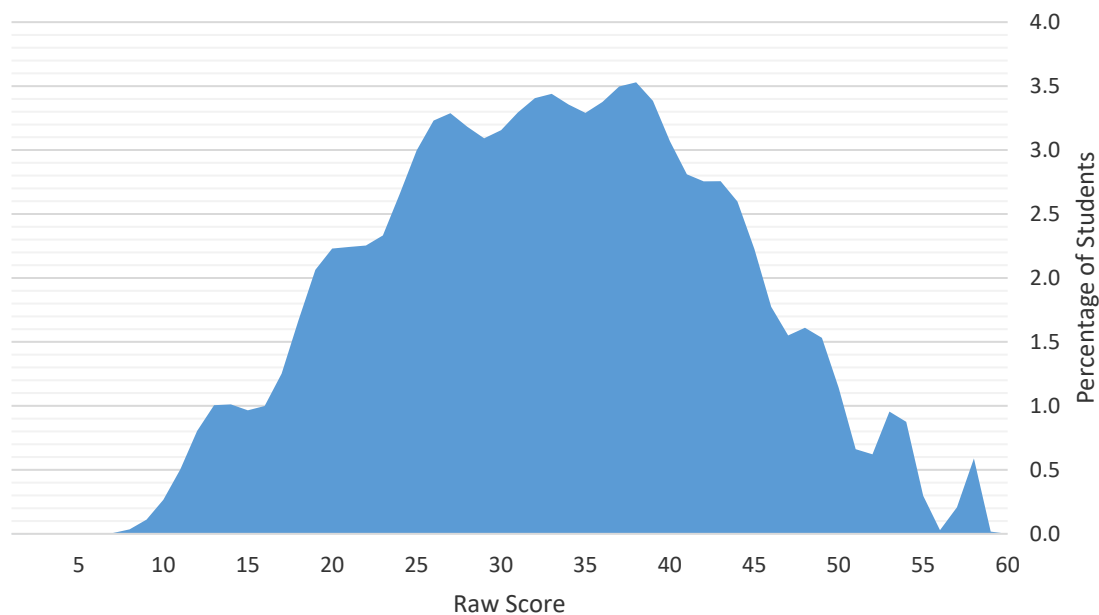


American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Thermodynamics and Kinetics

Score	Percentile	Score	Percentile	Score	Percentile
60	100	34	51	8	0
59	100	33	48	7	0
58	99	32	45	6	0
57	99	31	41	5	0
56	99	30	38	4	0
55	99	29	35	3	0
54	98	28	32	2	0
53	97	27	29	1	0
52	96	26	25	0	0
51	96	25	22		
50	95	24	20		
49	93	23	17		
48	91	22	15		
47	90	21	13		
46	88	20	11		
45	86	19	9		
44	83	18	7		
43	81	17	6		
42	78	16	5		
41	75	15	4		
40	72	14	3		
39	69	13	2		
38	65	12	1		
37	62	11	0		
36	58	10	0		
35	55	9	0		

Mean	33.0
Std. deviation	10.3
Median	33
KR-21 reliability	0.88
Std error/meas	3.65

PH14M: Thermodynamics and Classical Kinetics Norms
based on the scores of 453 students from 24 different institutions



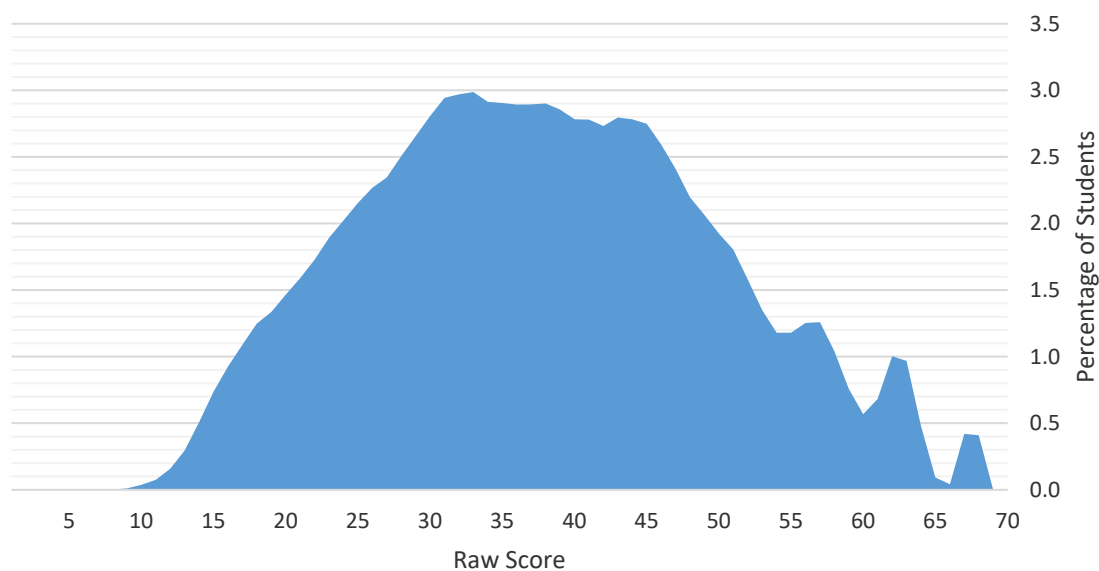
American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Thermodynamics, Kinetics and Dynamics

Score	Percentile	Score	Percentile	Score	Percentile
70	100	44	67	18	4
69	100	43	64	17	3
68	100	42	62	16	2
67	99	41	59	15	1
66	99	40	56	14	1
65	99	39	53	13	0
64	99	38	50	12	0
63	98	37	47	11	0
62	97	36	45	10	0
61	96	35	42	9	0
60	95	34	39	8	0
59	95	33	36	7	0
58	94	32	33	6	0
57	92	31	30	5	0
56	91	30	27	4	0
55	90	29	24	3	0
54	89	28	22	2	0
53	87	27	20	1	0
52	86	26	17	0	0
51	84	25	15		
50	82	24	13		
49	80	23	11		
48	78	22	9		
47	75	21	8		
46	73	20	6		
45	70	19	5		

Mean	37.8
Std. deviation	12.2
Median	37
KR-21 reliability	0.90
Std error/meas	3.94

PH14M: Thermodynamics, Classical Kinetics and Molecular Dynamics Norms

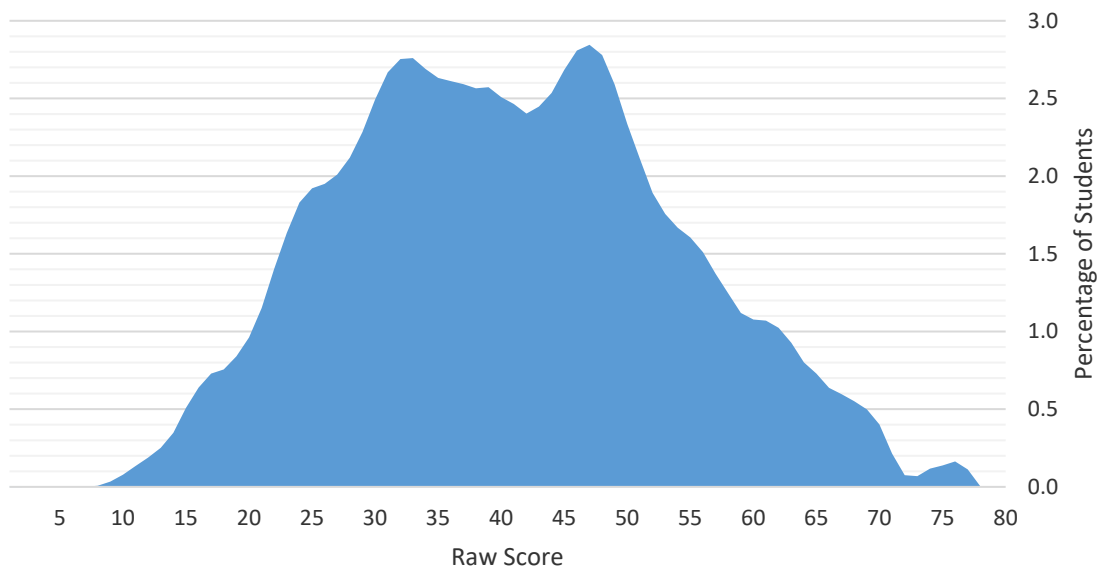
based on the scores of 453 students from 24 different institutions



**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Quantum Mechanics, Kinetics, Dynamics and Statistical Mechanics**

Score	Percentile	Score	Percentile	Score	Percentile	Score	Percentile
80	100	55	84	30	22	5	0
79	100	54	82	29	19	4	0
78	100	53	81	28	17	3	0
77	100	52	79	27	15	2	0
76	100	51	77	26	13	1	0
75	100	50	74	25	11	0	0
74	99	49	72	24	10		
73	99	48	69	23	8		
72	99	47	66	22	7		
71	99	46	63	21	5		
70	99	45	60	20	5		
69	98	44	58	19	4		
68	98	43	55	18	3		
67	97	42	53	17	2		
66	96	41	51	16	2		
65	96	40	48	15	1		
64	95	39	46	14	1		
63	94	38	43	13	0	Mean	40.7
62	93	37	40	12	0	Std. deviation	13.2
61	92	36	38	11	0	Median	40
60	91	35	35	10	0	KR-21 reliability	0.90
59	90	34	32	9	0	Std error/meas	4.25
58	88	33	30	8	0		
57	87	32	27	7	0		
56	86	31	24	6	0		

PH14M: Quantum Mechanics, Classical Kinetics, Molecular Dynamics and Statistical Mechanics Norms
based on the scores of 453 students from 24 different institutions

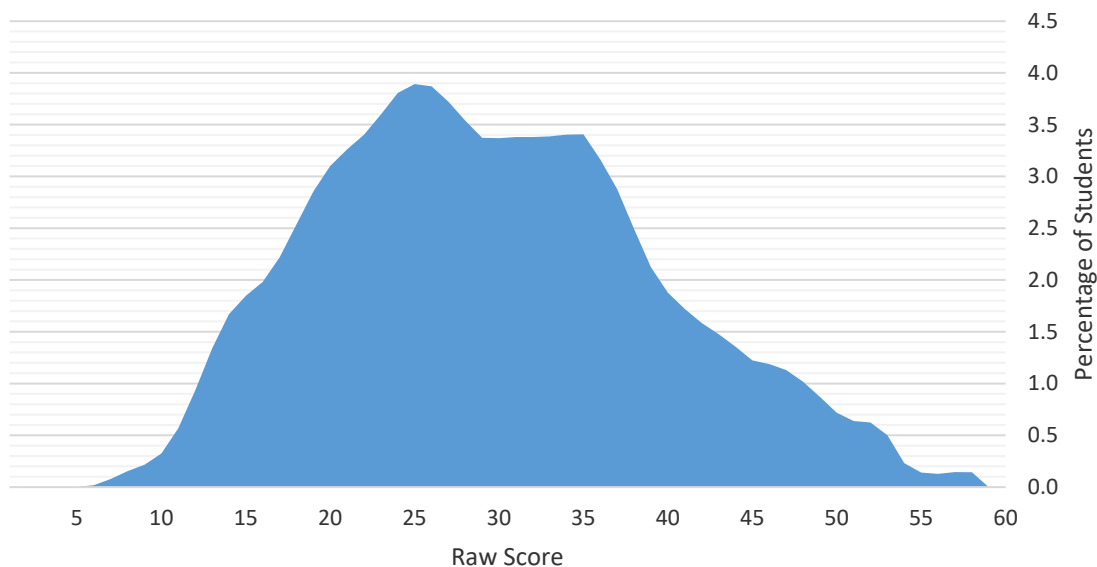


**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Quantum Mechanics, Dynamics and Statistical Mechanics**

Score	Percentile	Score	Percentile	Score	Percentile
60	100	34	66	8	0
59	100	33	62	7	0
58	100	32	59	6	0
57	100	31	56	5	0
56	100	30	52	4	0
55	99	29	49	3	0
54	99	28	45	2	0
53	99	27	42	1	0
52	98	26	38	0	0
51	97	25	34		
50	97	24	30		
49	96	23	27		
48	95	22	23		
47	94	21	20		
46	93	20	17		
45	91	19	14		
44	90	18	11		
43	88	17	9		
42	87	16	7		
41	85	15	5		
40	83	14	4		
39	81	13	2		
38	79	12	1		
37	76	11	1		
36	73	10	0		
35	69	9	0		

Mean	29.6
Std. deviation	10.0
Median	29
KR-21 reliability	0.86
Std error/meas	3.68

PH14M: Quantum Mechanics, Molecular Dynamics and
Statistical Mechanics Norms
based on the scores of 453 students from 24 different institutions



**American Chemical Society Division of Chemical Education
Composite Norms – 2014 Physical Chemistry Modular Exam (PH14M):
Thermodynamics and Dynamics**

Score	Percentile
50	100
49	100
48	99
47	99
46	98
45	96
44	95
43	94
42	92
41	91
40	89
39	88
38	86
37	84
36	82
35	79
34	77
33	73
32	70
31	66
30	63
29	59
28	55
27	51
26	47
25	43

Score	Percentile
24	39
23	35
22	31
21	27
20	23
19	19
18	16
17	13
16	11
15	8
14	6
13	4
12	2
11	1
10	0
9	0
8	0
7	0
6	0
5	0
4	0
3	0
2	0
1	0
0	0

Mean	26.9
Std. deviation	9.0
Median	26
KR-21 reliability	0.86
Std error/meas	3.32

PH14M: Thermodynamics and Molecular Dynamics Norms
based on the scores of 453 students from 24 different institutions

