1. **Differences between actual and rated capacities**

A. **Differential explanation:**

Active or operational capacity refers to the actual capacity of the power bank. However, the power bank (battery) operates at 3.7V while typically used to charge devices that operate at 5V. The needed voltage conversion causes energy loss, which is often encountered by consumers using smartphones, tablets, and other 5V devices. A calculation for this energy loss follows.

B. **Differential calculation formula:**

Rating = operational power bank capacity x 3.7V
battery voltage ÷ 5V x cell conversion efficiency (varies for each situation). For example, a 5000mAh battery with 85% conversion efficiency will deliver an actual 3145mAh to consumers based on 5000 x 3.7 ÷ 5 x 85% = 3145.

C. **How many times can a power bank recharge a given device?**

This is simple: take the actual capacity of the power bank and divide by the rated capacity of the device. For example, a 5000mAh power bank with an actual situational capacity of 3145mAh and connected to an iPhone 4 (battery rated 1420mAh) is enough for just over two full device battery recharges.

D. The table below shows calculations for different popular devices when connected to ADATA power banks of various capacities.

Device	Model	Battery Capacity	Numbers of charge									
			PV120-5100mAh	PV150-10000mAh	PT100-10000mAh	P12500D-12500mAh	P20000D-20000mAh	X7000-7000mAh	A10050-10050mAh	A10050QC-10050mAh	D8000L-8000mAh	D16750-16750mAh
Smartphone	iPhone 6S	1715 mAh	1.97	3.76	3.86	4.70	7.51	2.70	3.81	3.78	3.09	6.34
	iPhone 6S plus	2750mAh	1.23	2.34	2.41	2.93	4.69	1.69	2.37	2.35	1.93	3.96
	iPhone 7	1900 mAh	1.78	3.39	3.48	4.24	6.78	2.44	3.44	3.41	2.79	5.73
	iPhone 7 plus	2900mAh	1.16	2.22	2.28	2.78	4.44	1.60	2.25	2.23	1.83	3.75
	Samsung S7	3000mAh	1.13	2.15	2.21	2.68	4.29	1.54	2.18	2.16	1.77	3.63
	Samsung S7 edge	3600mAh	0.94	1.79	1.84	2.24	3.58	1.29	1.81	1.80	1.47	3.02
	Samsung S8	3000mAh	1.13	2.15	2.21	2.68	4.29	1.54	2.18	2.16	1.77	3.63
	Samsung S8 plus	3500mAh	0.96	1.84	1.89	2.30	3.68	1.32	1.87	1.85	1.51	3.11
	Samsung Note 8	3300mAh	1.02	1.95	2.01	2.44	3.90	1.40	1.98	1.96	1.61	3.30
	Huawei P9	3000mAh	1.13	2.15	2.21	2.68	4.29	1.54	2.18	2.16	1.77	3.63
	Huawei P9 plus	3400mAh	0.99	1.89	1.95	2.37	3.79	1.36	1.92	1.90	1.56	3.20
	Huawei P10 plus	3750mAh	0.90	1.72	1.77	2.15	3.44	1.24	1.74	1.73	1.41	2.90
	Huawei Mate 9	4000mAh	0.84	1.61	1.66	2.01	3.22	1.16	1.63	1.62	1.32	2.72
Tablet	iPad Mini 4	5124mAh	0.67	1.28	1.32	1.60	2.56	0.92	1.30	1.29	1.05	2.16
	iPad Air 2	7340mAh	0.47	0.90	0.92	1.12	1.79	0.65	0.91	0.90	0.74	1.51
	iPad (2017)	8827mAh	0.38	0.73	0.75	0.91	1.46	0.53	0.74	0.73	0.60	1.23
	iPad Pro 9.7in	7306mAh	0.47	0.89	0.91	1.11	1.78	0.64	0.90	0.89	0.73	1.50
	iPad Pro 10.5in	8134mAh	0.42	0.79	0.81	0.99	1.58	0.57	0.80	0.80	0.65	1.34
	iPad Pro 12.9in	10307mAh	0.33	0.64	0.65	0.79	1.27	0.46	0.64	0.64	0.52	1.07
	Samsung Tab J	4000mAh	0.84	1.61	1.66	2.01	3.22	1.16	1.63	1.62	1.32	2.72
	Samsung Tab E	5000mAh	0.68	1.29	1.32	1.61	2.58	0.93	1.31	1.29	1.06	2.18
	Samsung Tab A	7300mAh	0.46	0.88	0.91	1.10	1.76	0.63	0.89	0.89	0.73	1.49
	Samsung Tab S2	5870mAh	0.58	1.10	1.13	1.37	2.19	0.79	1.11	1.10	0.90	1.85
	Samsung Tab S3	6000mAh	0.56	1.07	1.10	1.34	2.15	0.77	1.09	1.08	0.88	1.81

2. **What are the differences between lithium ion (li-ion) and lithium polymer (li-polymer) batteries?**

The main difference is the internal use of electrolytes. Lithium ion batteries use liquid solutions, while lithium polymer batteries have solid or gel-like solutions.

While both types have reached mature manufacturing development and are safe to use, li-ion batteries are more subject to overcharge. In extreme situations, the liquid inside the battery may rupture the battery casing due to high internal pressure, and then come in contact with oxygen in the atmosphere, which theoretically could cause combustion – or an explosion. However, this is very unlikely. Li-polymer batteries are more expensive because their solid solutions are more stable and durable, thus lowering risk.

Additionally, the global market has plentiful supply of li-ion batteries with cell size 18650 supposedly from Japan or South Korea. These are actually recycled or second hand batteries, so we highly recommend choosing reputable brands if purchasing batteries identified as 18650.

Li-polymer batteries	Aspect	Li-ion batteries (18650 cell size)
Around 25% more than 18650 batteries	Cost	Approx. 25% cheaper than li-polymer batteries
Plastic film	Casing material	Stainless steel
Variable on demand per application	Form factor/dimensions	Cylindrical, fixed size (diameter 18mm/height 65mm)
About 40% lighter than 18650 batteries	Weight	Around 40% heavier than li-polymer batteries
More stable and safe, only expands in extreme situations	Safety	Varies greatly by manufacturing process and quality assurance, potential risk of explosion
Very few used batteries on market	Availability of used batteries	Large supply of recycled, used batteries throughout the global market